THE

REGISTER OF ARTS,

AND

JOURNAL OF PATENT INVENTIONS.

VOLUME FIRST,

NEW SERIES.

EDITED

BY L. HEBERT,

MECHANICAL DRAFTSMAN, AND CIVIL ENGINEER.

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PREFACE.

Established custom seems to require, that the completion of a first volume, although it be merely of a *new series*, in continuation of a former work, shall not be unattended with a few prefatory remarks; in this, however, we shall be very brief, as our views and intentions have been often announced before; and the inspection of our labours through the four preceding volumes, will afford sufficient proof of the sincerity of our professions, and of our ability to perform what we have undertaken.

Upon a slight examination of the present volume, it will be readily perceived that it contains within its limits, a much greater number of new inventions, and discoveries in science, than any other periodical work extant; which circumstance is accounted for by the simple fact, of the editor being professionally a Mechanical Draftsman and Patent Agent; which leads him to become theoretically and practically acquainted with, and enables him to describe, nearly all that is passing of importance in the mechanical world; consequently the major part of the matter introduced, consists of original descriptions by the editor; the remainder are the contributions of intelligent correspondents, together with selections from contemporary journals, the most prominent of which is the Franklin Journal, of Philadelphia, a work of singular excellence, and unrivalled in utility. To the learned editor of that work, (Dr. Jones), and to our correspondents generally, we therefore gratefully make our acknowledgments for their valuable assistance.

PREFACE.

In the future progress of our work, we see no reason to make any material alteration in the plan; our object will be to perfect it in all its details, and to perform every promise; the materials for which, by the kindness of friends, and our individual exertions, accumulate faster than we have hitherto been able to render available.

Upon casting our eyes upon the collection of papers in various stages of preparation for the ensuing volume, we cannot but feel a confidence that the work will continue progressively to improve in interest, variety, and originality; and that it will eventually prove one of the most valuable in a library for future reference, in the science and practice of mechanics.

"The London Mechanics' Register," having ceased to give reports of the valuable lectures delivered at The London Mechanics' Institution, it is our intention to introduce a more particular notice of these discourses than we have hitherto done, under the head of "Proceedings of Literary and Scientific Institutions," for the accommodation of the members who form no inconsiderable portion of the readers of this work.

1st March, 1828.

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Fig.1

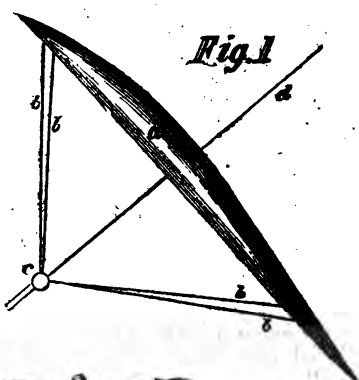
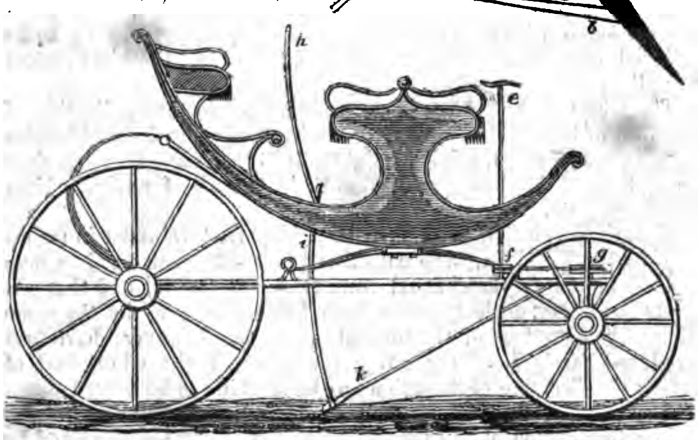


Fig.2



THE PATENT CHARVOLANT.

THE PATENT CHARVOLANT,

Or Carriage to be drawn by Kites, invented by Colonel JAMES VINEY, of the Isle of Wight, and GEORGE POCOCK, Esq. of Bristol.—*Enrolled Oct.* 1826.

THE patentees propose to attach to the car or vessel to be moved the cords of one or more kites, according to the force of the wind and the resistance to be overcome. The kite, *a*, fig. 1, is jointed in the middle that it may be folded up, and carried or stowed away with greater facility, and that it may be adjusted so as to present to the wind a surface of any required dimensions: this is effected by the four cords, *b b b b*, which are brought together by passing through the dead eye, *c*, whence they proceed to the car, and are arranged to the required lengths by the persons therein. The cords are also used for regulating the direction of the power, by shortening those on the right hand when the car is required to be turned to the right, and those on the left hand when it is required to be turned to the left. But the charvolant represented by fig. 2 is principally guided by the T handle, *e*, and stem, *e f*, which acts on the axis of the fore wheels by means of an endless band or cord passing about the pulley, *f*, fixed on the lower end of the stem, *e f*, and the pulley, *g*, fixed on the bed of the axletree of the fore wheels. The machine is stopped or its motion retarded by the drag, *k*, which is attached to the perch by a spring, to keep it off the ground, till the motion is required to be retarded or the car stopped, when its fluke end is pressed into the earth by the lever, *h*, acting on the connecting piece, *i*.

When great power is required, two or more kites are placed in succession one behind the other, and so attached together by cords that whatever motion or direction is given to one will be communicated to the others.

The patentees propose to attach occasionally to their car a platform on small wheels, for the purpose of carrying a poney to be employed in dragging the machine in cases where the kites cannot be applied.

The views of the patentees are not confined to the application of the power of kites to the moving of carriages upon land, but likewise to the sailing of ships, raising weights, and other purposes; but they do not describe in their specification their method of applying kites to raise weights.

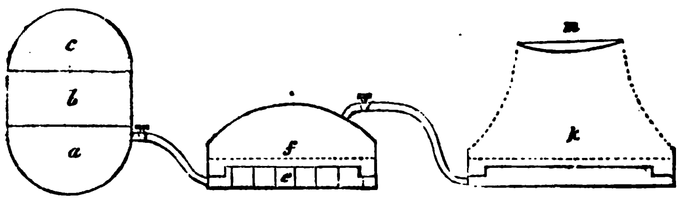
We are aware that kites have been employed to assist in swimming, by Dr. Franklin, who considered that with such an aid a man might swim across the channel from Dover to Calais, and that attempts have been made to move both boats and cars by the same means: the patentees of the present apparatus, however, have first introduced methods of regulating the force of the wind, and of varying the direction of its action on the machine to be moved.

And this, although the arrangements may contain many imperfections in common with schemes which have not been corrected by experience, is an important step towards making this powerful agent of nature serviceable to man.

PATENT SALT PANS.

By William Johnson, of Droitwich.—*Enrolled June*, 1827.

Mr. Johnson employs steam of different degrees of heat, to produce the evaporation in pans entirely enclosed from the atmosphere, so that the vapour arising from the first pan, where the *fine salt* is produced, is employed in heating the second, where the *broad salt* is formed; and the vapour arising from the latter is employed, in like manner, to produce in the third pan *British bay salt*.



A sketch of the steam boiler is represented in the annexed drawing, divided into three portions, *a*, *b*, and *c*; and steam is generated in one or more of these divisions, according to the supply required. When the steam in *a* is raised to a pressure of twenty-five pounds on the square inch, that in *b* will be twelve, and that in *c* five pounds.

When only one of the divisions, *a*, of a steam-boiler about seventeen feet by ten is employed, it will heat pans to the extent of 2400 square feet up to 164° Fah. And when the three divisions, *a*, *b*, and *c*, are used together, an extent of 4300 square feet will be heated to the same temperature.

The steam is conveyed in a pipe from the boiler to a steam vessel *e*, under the fine salt pan *f*. This pan is made steam-tight, and the steam arising therein is conveyed by a pipe to a similar vessel under the broad salt pan *k*. Over the broad salt pan *k* is placed the bay salt pan *m*, and the space between them is enclosed by thin boards or other light material, to confine the vapour arising from *k*, in order to produce the required heat in the pan *m*. This pan is made lowest in the middle, as represented in the drawing, so that water condensed on its lower surface may be collected in one place, where it is received and carried off in a spout, to prevent its return into the brine in the lower pan *k*.

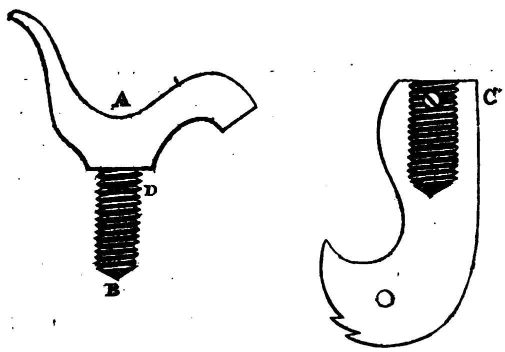
The patentee considers it of great importance to keep the bottom of the pans clear of salt, and for that purpose employs rakes, which are kept constantly in motion by a steam engine. These rakes deposit the salt in receptacles at the sides of the pans. The rods by which the rakes are moved pass through stuffing-boxes in the pans, to prevent the escape of steam. When there are many rakes in a row to put in motion, it is effected by a horizontal shaft from the steam engine, which by means of bevil gearing puts in motion a series of nuts, screwed upon the rake-rods, by which the various rakes are made alternately to advance and recede.*

* The patentee has omitted to explain his method of reversing the motion of the nuts.—Ed.

For the purpose of making the interior surface of the pans smooth, to facilitate the removal of the salt, the pieces of which it is com-

posed are united by turning down the edges at right angles, and rivetting them together, as represented by the annexed sketch. The steam vessels under the pans are strengthened by a number of link bolts, attached to the joinings underneath the pans by a forked end, taking in the bent joinings, and to the bottom of the steam vessel, by being hooked to staples, as represented.

We have deemed it unnecessary to enter into farther detail of Mr. Johnson's process of making salt, as it does not in other respects differ from the plan heretofore used by him, and for which he obtained patents in 1823 and 1824.



IMPROVED FIRE ARMS.

To the Editor.

Sir,—The following is a plan, for discharging a double barrelled pocket pistol, on the percussion principle, with only one lock. It is quite as simple, and more certain, than the way in which it is effected with the flint lock.

The barrels are placed side by side, or they might, with a little more workmanship, be placed one above the other; and each has its separate nipple. The cock will be better understood, by referring to the figure: the upper part of it A, is fixed to the lower part by the strong screw B, and a small pin or screw C is passed through them both, the hole D being wider than the pin, in order to admit of the top of the cock being turned a little one way or the other.

The pistol is kept with the cock turned either way; and on one barrel being fired, all that has to be done, is to cock the pistol again, and turn the cock the other way as far as it will go, when it will be ready to strike the cap on the other barrel.

I am, Sir, your's truly,

J. L. E.

It appears to us to be essential to the perfection of the foregoing plan, that there should be some kind of regulating stop to the motion of the "upper part A," in order that the hammer may strike with certainty and precision, on the right place. To effect this, we would suggest the employment of a curved spring, rising in the middle, to be fixed in the hole D, after the manner we have taken leave to represent it in the figure. This addition to the drawing of our ingenious correspondent, J. L. E., we trust he will excuse. —EDITOR.

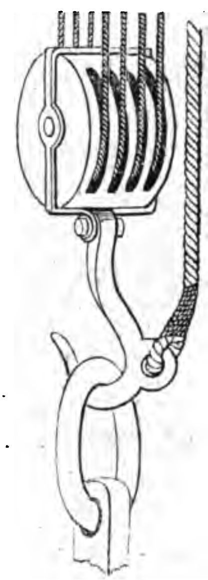
PATENT CAT BLOCK,

By Mr. THOMAS HILLMAN, Millwall.

To the Editor.

SIR,—Having experienced the practical utility of Hillman's improved cat block, I beg leave to send you the annexed description of it, for the information of my salt-water brethren.

Your's,—AN OLD SEAMAN.



By the common method of catting an anchor, the anchor being once hooked by the cat-block, the whole process of catting and stopping the anchor, overhauling the cat-fall, and unhooking the block, must be performed before the anchor can be let go again; hence many ships navigate rivers, with the anchor hanging under water, which materially affects the steering of the ship.

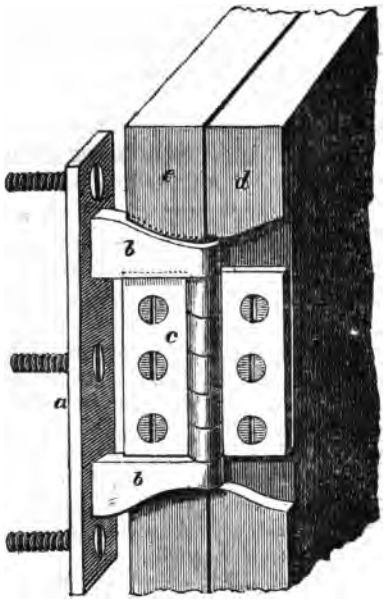
By this plan, when an anchor is to be catted, the bite of the stopper is carried forward, to assist in conducting the cat-block to the ring of the anchor. When hooked, the anchor is catted in the usual manner, and the stopper being passed over a cleet at the end of the cat head, the slack of the stopper is taken up and belayed.

To let go the anchor, nothing more is requisite, than to let go the leading part of the cat-fall, which by rendering, slowly transfers the weight of the anchor without surging to the stopper, which then unhooks the cat-block. By this plan therefore, the anchor may be let go instantly, during any period of the act of catting it, and it may be let go, at any height between the cat-head and the water's edge.

IMPROVED HINGE FOR LIBRARY DOORS, &c.

BY the ordinary method of hanging doors to libraries, the hanging-stiles are fixed to the vertical partitions of the shelves, and, being necessarily of a greater width than the latter, the books behind them camot be got out without displacing those adjoining. To

remedy this inconvenience, an exceedingly simple and effectual contrivance has been lately adopted by Mr. Nettlefold, (of Red Lion Street, Holborn), in whose warehouse we saw it, and were permitted to take the annexed sketch, with the mode of its application.



a is a brass plate, which is screwed to an upright partition; *b b* are two projecting parts, (cast in one piece with *a*), with the extremities rounded off, and perforated to receive the centre pin, which passes alike through them, and the joint of the common *butt-hinge c*. To the flaps of the latter are screwed the doors *d* and *e*, portions of which only are brought into view, to save room. It will be observed that the door *e* lays back quite level with the (supposed) shelves, and that the door *d* folds close against *e*, so as to lie parallel with it, and quite out of the way. This being the case as represented in the figure, it is equally obvious, that when the door *d* is turned back the contrary way, both doors are thereby shut, and lie quite flush and close; and that the door *e* may then in like manner be folded over *d*. The greatest facilities are thus afforded by a *single* hinge, instead of *two* hinges, and without the necessity of any additional hanging stile. Upon the whole, we trust our readers will think with us, that this is a very clever little contrivance, and may be applied with similar advantages in many other situations besides library doors.

HARDENED STEEL PLATES,

An easy Method of Dividing and Perforating, by Dr. Thomas P. Jones, *Editor of the Franklin Journal.*

Workmen frequently wish to divide a broken saw plate, for the purpose of converting it into scrapers, square blades, or small saws; this is usually attempted by notching them to a small depth with a cold chisel, and then breaking them along the lines so made. When the plate is very hard this method will not succeed, and the plate is frequently destroyed in the attempt. When it does succeed, the plate is generally twisted and *buckled* in the operation.

The Editor had a hard plate, which he was desirous of cutting into strips, to make small saws for a working model of a saw mill; this, although too hard to yield to the chisel, he divided with the utmost

facility, piercing the ends at the same time, for the purpose of stretching the saws; this was effected in the following manner. The saw plate was made sufficiently warm to melt bees-wax, which was then rubbed over it, so as to coat it completely on both sides, when it was suffered to cool. Lines were then drawn through the wax on both sides of the plate, with a steel point. It being of great importance that these lines should be exactly opposite to each other, this was effected by making a saw-kerf in the strip of wood which was used as a straight-edge, and the plate being placed in the kerf, the opposite lines were easily drawn. A mixture of sulphuric acid *(oil of vitriol)* and water had been prepared, and suffered to become cold; the proportions about one part of acid to six of water. The saw-plate was then placed in a common queen's-ware dish, sufficiently large to contain it within the rim, and the acid and water were poured into it, so as just to cover the saw plate; in about half-an-hour it was taken out, washed in clean water, and the wax scraped off, the lines having been bitten in to a sufficient depth to cause the plate to break with great ease. Some pieces which were left in too long were eaten quite through, and the edges rendered rough and indented by the action of the acid.

At the ends of the plates, where holes were wanted, the wax was removed on each side; it was found necessary, sometimes, to insert these ends in the fluid, longer than the time allowed for the action on the lines; this, however, depends upon the thickness of the plate. Circular saws may be readily made in this way, and their centres perforated to any size. Square or round holes may be made through a plate of one-fourth of an inch in thickness without the slightest difficulty. To effect this, after covering the part with wax, and scratching through it, in the way directed, a wall, or bank, of wax is to be placed round it, so as to form a cup, into which the liquid may be poured; this operation must be repeated on the opposite side, and when the lines are bitten to a good depth, the piece may be punched out.

Whenever the plate to be divided or perforated is large, a bank of wax may be made to surround the parts, or the acid and water may be repeatedly washed over the lines, until the corrosion is sufficiently deep.

Care should be taken to employ good clean wax; for the acid will find its way through it wherever there are any specks of dirt, and thus injure the face of the plate. Engravers' etching ground would be a better article than wax, but the latter is easily obtained, and, if pure and clean, will answer very well.

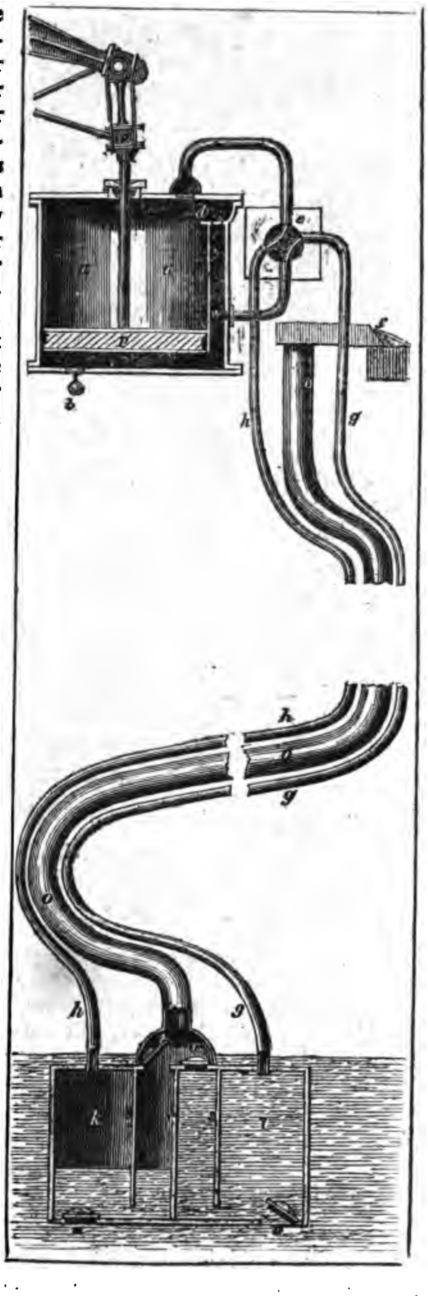
Saws and other tools of iron or steel, may be readily marked with the name of the owner of them, by the foregoing process.

PATENT HYDRAULIC MACHINE,

For raising Water from Mines, or communicating Motion at a distance from the first mover, by CHARLES SEIDLER, Esq. of Crawford Street, Portman Square.—*Enrolled June*, 1827.

THE patentee proposes to raise water from any depth, and through any straight or circuitous passage, by means of air communicated in

pipes from the place where the pumps can be most conveniently worked to the reservoir or place from which the water is to be raised, in the manner represented in the accompanying figure: where *a a* represents a cylinder, in which a piston, *p*, works by means of a steam engine or other power. *h g* are copper pipes, forming a communication between the cylinder, *a a*, and the cast-iron tank or vessel, *k l*; *o o* is a large delivery pipe, of copper or other material, through which the water is conveyed from the tank and discharged; at *r* is an air-tight partition, dividing the tank into the two parts, *k* and *l*; and *s s* are two air-tight partitions, proceeding from the top nearly to the bottom of the tank: *e* is a two-way cock for effecting an alternate communication between *a* and *k*, and between *a* and *l*.



The other parts of the machine will be explained in the following description of action. Suppose the piston, *p*, to be raised from its present position in the cylinder, the air above it will be conveyed through the valve *c*, and the pipe, *h*, into the vessel, *k*, and force the water contained therein through the valve, *t*, up the pipe, *o o*, while air will be supplied to the cylinder below the piston through the valve, *b*. When the piston descends the air will pass from the lower to the upper side of it by the valve, *d*; this operation is to be continued till all the water is forced out of *k*, when the

two-way cock, *e*, must be turned to change the communication through the valve, *c*, to the pipe, *g*, and the part of the tank, *l*, at the same time: the air which was forced into *k* will be permitted to re-enter the cylinder through the pipe, *w*, (as shown by the dotted lines in the cock, *e*, so that no air will be required to enter at the valve, *b*, except at the commencement of the operation, or when any of the air is discharged with the water, or otherwise dissipated. When the air is liberated from the receptacle, *k*, of the tank, it will be again filled with water through the valve, *m*; the valve, *i*, being shut by the pressure of the water in the pipe, *o o*. During this time the water in *l* will be forced through the valve, *u*; in the same manner from *k*, through the valve *i*. The cock *e* to be turned by the hand or by the machinery, after such a number of strokes of the piston in the cylinder as is sufficient to displace the water in one division of the tank.

Mr. Seidler also proposes to put machinery in motion at any distance from the first mover, by raising a piston in a cylinder with air forced under it, which is permitted to descend by its own gravity when the air is liberated, thus producing an alternating motion to be applied to any required purpose.

The patentee does not claim any thing new in the manner of working the pistons, valves, or cocks, but merely in his method of applying a column of air to produce the effects described.

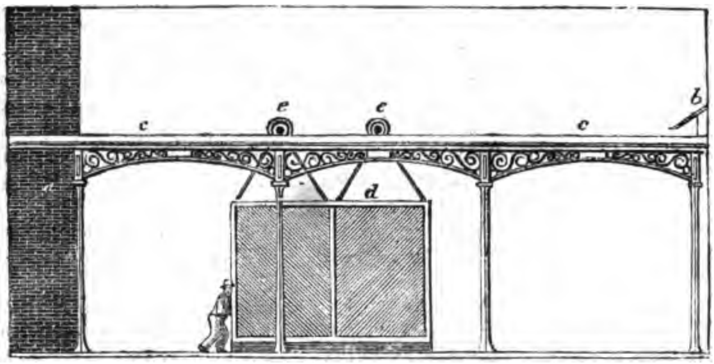
There are many instances connected with mining and excavations of the earth, where water has to be pumped from depths considerably exceeding that to which atmospheric pressure will raise it, and where the localities of the place prevent the possibility of extending a piston rod from the place where the power can be applied to the water to be raised; and to all such cases this method appears to be applicable; for the pipes may be extended indefinitely, and in any direction to the place from which it may be necessary to remove the water.

SUSPENSION GATES,

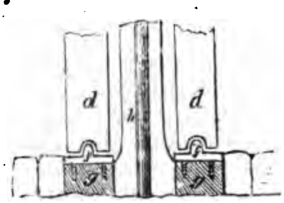
At the London Docks, on Mr. H. R. Palmer's Patent Principle.

Having lately visited the London Docks to view the improvements that are being made under the able superintendence of the company's engineer, H. R. Palmer, Esq. we were much gratified in noticing another application of that gentleman's patent Suspension Railway, in the construction of some sliding or rather rolling gates, erected at each end of the northern avenue, between the warehouses and the water side, which are intended as an additional security from depredation of the inclosed property, in the intervals during the cessation of the public business. They will, when completed, not only be highly useful in preventing the intrusion of improper persons, but form an ornamental feature to this interesting establishment. During the hours of business these gates are rolled back against the side walls of the end warehouses, to which they stand close and parallel, occupying no useful room. In opening or shutting them, nothing need be moved out of the way, and it is done with great facility and dis-

patch. Being suspended entirely from above, and not even touching the surface of the ground, it is not not subjected to the adventitious obstacles common to other gates.



a is intended to represent part of the wall of the ranges of warehouses, and *b* the extremity of the range of sheds, on the opposite side of the avenue. *c c*, a double railway, extended entirely across the avenue from *a* to *b*, and likewise to the width of a gate beyond on each side; it is supported by slightly curved arches of wrought iron, with ornamental scroll-work between the arches and the double rail, the superstructure resting upon lofty columns of cast iron. One of the three gates *d*, (each of which fills up the space between two columns,) is shewn in the act of being closed, by a man pushing it along: from its large dimensions and great weight, (though chiefly composed of wood,) this could not be easily effected by the simple force of one man, but being constructed on the principle of Mr. Palmer's patent railway, (fully described in the 7th, 8th, and 47th numbers of our first series,) the friction is reduced to a very inconsiderable amount, the whole weight of each gate, being entirely suspended by iron rods, to the axles of the little wheels which run on the top of the railway, which are kept in their track, by their peripheries being flanged. The gates do not rest upon, or even touch, the ground, but are merely guided in their course, by means of a projecting edge fixed in their path: this will be easily explained by means of the annexed diagram, which represents a transverse section of these parts. *f f* are two plates of iron, with raised edges in the middle, which are screwed down to oaken sleepers *g g*; and above these, is shewn an edge view of the lower ends of the gates, which run on either side of the column *h*. (The sketches accompanying this subject, were made by us from memory, and consequently may not, in the unimportant part of the details, be precisely like the real object; but nothing has been omitted that is essential.)



THAMES TUNNEL.

As public journalists recording passing occurrences connected with the arts and manufactures of this country, we ought not altogether to omit noticing an accident which has recently occurred at the Tunnel excavating under the Thames at Rotherithe: although we do this at the risk of repeating to our readers that with which they are already acquainted: for who has not heard of the water breaking into the Tunnel, and the numerous plans which have been proposed to Mr. Brunel the engineer, for removing the defect, and preventing the recurrence of the disaster ?*

Previous, however, to describing the irruption of the water, it may not be uninteresting to give a brief account of the shield employed for the protection of the workmen and the works during the whole of the excavation.

It is composed of a cast iron frame of immense strength, and is capable of bearing an almost incalculable pressure. Its extreme dimensions are 37 feet in width, 21 feet 6 inches in height, and 7 feet in depth. The shield is divided into twelve perpendicular frames, and each frame is subdivided into three stories, called cells, or boxes. The utility of the framing consists in its supporting the superincumbent weight, and in protecting and shielding the workmen employed from the possibility of accident. One miner works in each of the stories or cells, consequently thirty-six men are thus enabled to pursue their operations at the same time. Each division has a roof of cast-iron plates, polished on the upper surface, so as to slip easily over the stratum of clay which rests upon it, and is supported by two strong cast-iron plates, called shoes, and which rest upon the gravel at the base. The motion of each division seems to have been planned upon the principal of the human frame, and is thus effected :—Each of the miners in the three cells excavates the ground in front of him to the depth of nine inches, until the perpendicular height of the soil in front of the division, which is to be advanced, is excavated. He then supports the face of the soil by means of small planks called polings, and shuts them with screws to the adjoining divisions which are at rest. The next operation consists in unscrewing and slackening one of the legs, while the other supports the weight of the machine. The slackened leg is then advanced at two separate times to the length of nine inches, and is screwed up tight. When properly secured, the other leg is advanced, together with the shoes, in the same manner; and the division is then moved forward nine inches, by means of two horizontal screws and levers, one at the top and the other at the lower part of the division. One end of these screws is fixed in the frame, and the other abuts on the brickwork.

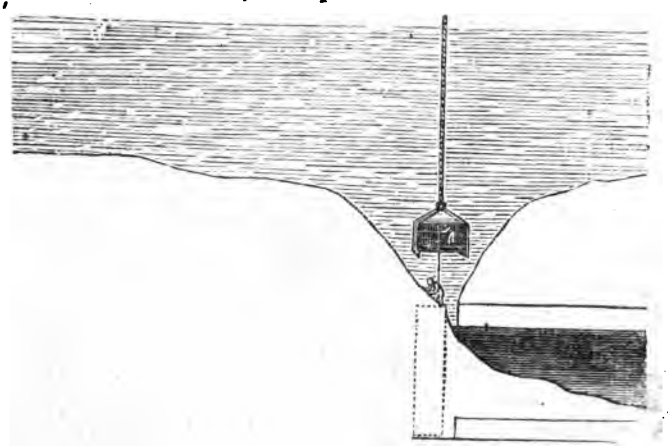
* We were sorry to observe in some of the public journals Mr. Brunel accused of inattention to the persons proposing these schemes, and neglect of the schemes proposed, as we know the reverse to be the case; for our correspondent, Mr. M. Garvey, whose ingenious plan, described in No. 103 of our first series, was received with the greatest kindness, and the merits of his plan fully considered: he was even advised by Mr. Brunel to publish an account of it as likely to be of public utility.

Each of the divisions is moved in a similar manner, until the whole of the twelve are advanced nine inches, when the bricklayers immediately follow up with the brickwork, building one brick in length in straight joints. This brickwork again forms an abutment for the horizontal screws; and thus work proceeds, alternately moving the machinery forward, and following with the brickwork.

The safety and ingenuity of the construction of this machine has manifested itself during the late irruptions; for the small planks in front have prevented the face from falling in, whilst the slippers attached to the extreme boxes have counteracted a similar inconvenience at the sides.

For several weeks previous to the irruption of the water on the 18th May, it was discovered, by the frequent descent of pieces of bone, brickbats, coals, &c. from the bed of the river to the works, that the earth or rather the mud between the water and the Tunnel was exceedingly loose, and even at times in motion. Although much water had occasionally penetrated the works, the engine was found sufficient to remove it, and the work proceeded with very little interruption, till that time when the irruption of water between the shield and brickwork was so great as to oblige the men to make a hasty retreat, which they did with much order, and all escaped in safety. This irruption, which soon filled the Tunnel, was much augmented by the action of the water on the last row of brickwork before it was completed, and the cement had had time to set.

On examining the bed of the river after the accident with the diving bell, a spacious cavity was discovered over the spot, which terminated in a small hole descending into the Tunnel between the shield and the brickwork; as represented in the annexed sketch.



This hole, as well as a second which subsequently broke out in another part of the cavity, has been since filled up with bags of clay, and large quantities of loose clay and gravel, thus making an artificial bed to the river: and this new-made part is protected from the

effects of the tide by a raft 35 feet square, skirted with a tarpaulin covering in all about 8,800 square feet. This artificial bed of clay has now become very firm, the water has been removed, the shield and works have been cleared, and are found uninjured, and it is expected that the excavations will be forthwith recommenced.

SCIENTIFIC INSTITUTIONS.

ROYAL INSTITUTION, ALBEMARLE STREET.—At the meeting of the members and their friends on Friday evening, June 1, Mr. Turrell described the various useful and ornamental applications of the Diamond, with the methods of cutting, polishing, and setting it, and illustrated his details with numerous specimens of the gem in various states, and many works performed by means of it.

June 8. Professor Millington gave an interesting lecture on the various improvements made in the Steam Engine from its first introduction to the present time, and particularly detailed the improvements recently applied both in its construction and application. The professor on this occasion explained to the meeting Perkins's engine, and his method of generating high-pressure steam; Mr. Brunel's proposed engine, to be worked by alternately condensing to a liquid state, and restoring to its gaseous form carbonic acid gas, by slight changes of temperature; and Mr. Brown's gas vacuum engine, a large model of which was put in motion in the theatre. But all these inventions having been described by us in the first series of this work, are already familiar to our readers.

June 15. Mr. Faraday related the progress and present state of the Thames Tunnel. It was illustrated by Mr. Brunel's drawings and models, and contained a particular account of the recent irruption of water upon two occasions, and the means by which the defect has been remedied.

On concluding, Mr. Faraday announced that these Friday evening meetings would be discontinued till next season.

LONDON MECHANICS' INSTITUTION.—June 29. Dr. Birkbeck concluded the first division of his extensive course of Lectures *on the Human Body*. In these lectures the President, in his usual clear and popular manner, treated first of the *bones* composing the skeleton; secondly, of the muscles and their attachments; and thirdly, of the intestines. The second division, which will be delivered in the course of the Autumn, will be devoted to the *physiology of man*, comprehending the functions of the various structures.

June 27 and July 4. Dr. Mitchell lectured on the *Architectural Antiquities of the City of Rome*. These lectures were illustrated by beautiful drawings of the principal ancient edifices in that splendid city. At the conclusion of the lecture on Friday last, the Chairman announced, that on,

July 6. Mr. Dowling would commence a short course on the *Theory and Practice of Calculations*; and that on,

July 11. Mr. E. W. Brayley would deliver the first of three Lectures on the *Outlines of the Anatomy and Physiology of the*

Invertebrate Animals, as contrasted with those of man. These lectures will comprehend the subject of Luminiferous Animals.

Zoological Society.—The weekly lectures at this Society have lately proved eminently attractive. On the 13th Inst. a number of noble and distinguished supporters of the Institution attended to view the museum, and hear Mr. Brookes's concluding lecture on the *Comparative Anatomy of the thoraic and abdominal viscera of the ostrich.* On Wednesday, the 20th, Mr. Vigors delivered the final lecture for the present season, being a continuation of his observations on the *Affinities of Birds.* The order selected for illustration on this occasion was the *Gallinaceous* Birds; and in the course of a lecture replete with interest, a variety of rare and beautiful specimens were exhibited. Mr. Vigors also announced, that the establishment preparing for the Society in the Regent's Park is in a forward state, and that the gardens, with aviaries, &c. will be opened early in August.

At the Society of Arts there are no proceedings of public interest during the summer months, and the same may be said of the Astronomical, Geological, and several other Societies, but their transactions will be regularly noticed by us when they are resumed.

Botany.

Botanical Question.—Are all plants the result of the germination of a seed on virgin earth and vegetable mould?—It is undoubtedly a very remarkable phenomenon, that the earth, when dug to the depth of eight or ten feet, or more, produces all sorts of plants, provided it is advantageously exposed to the sun; but what is more extraordinary is, that this new vegetation frequently affords plants of kinds which have never been remarked in this country. It is natural to ask whence came these plants? Can it be admitted that the seeds of these new plants were contained in the several kinds of earths? But could all those seeds, which had been perhaps above three thousand years under ground, without having ever been exposed to the action of the sun, have preserved the power of regenerating? If we strew ashes on high and arid heaths, we should see sometime afterwards clover and vetches growing there, though those two plants had never been seen in those places. Shall we believe that the seed of the clover and vetches was in the ground, and only waited for a stimulus to generate? How did it come there? We know that high and arid heaths never produce clover; it cannot, therefore, be considered as proceeding from a plant which formerly grew there. But even should we admit the possibility that these kinds of earth may contain clover seed, this opinion cannot be obtained in some parts of East Friesland, where wild clover is made to grow by strewing pearl ashes on peat marshes.—*New Monthly Mag.*

Mineralogy.

King of Portugal's Diamond.—From the following statement of the weight of the largest diamonds known in Europe, it will be seen that the King of Portugal possesses the very largest. The dia-

mond of the Emperor of Russia weighs 106 carats!* that of the King of France, 136; that of the Grand Duke of Tuscany, 139; that of the Great Mogul, 279; that of the King of Persia, 493; that of the King of Portugal, 1610 carats. The value of this last is estimated, by the Portuguese jewellers, at 200,000,000 of pounds sterling; by the French jewellers, at 1200,000,000 of French livres: and by the English and Dutch jewellers, at 55,787,300 pounds sterling.—*Hamburgh paper.*

Manufactures.

Cast Metal Pianos.—Every day the use of cast iron is becoming more general; bridges and steam-boats are made of it; in England it is used for roads; and at Liverpool, churches are built of it. Here, in Paris, we have lately got pianos, the frame-work of which is formed of cast iron. These instruments have been brought to such perfection, by MM. Pleyel and Company, that not only do they rival, but, in many particulars, surpass the best English instruments. The solidity of the frame-work is so great, that they seldom get out of tune, and the sound-board relieved from those enormous pieces of wood with which it was formerly cumbered, in order to resist the strain, possesses much more elasticity, and seconds the vibration of the strings, much better. The tone of these instruments is wonderful, both in power and mellowness; and the mechanism is so perfect, that it admits of the most delicate, as well as of the strongest touch. Indeed, we have no doubt that when they are known, they will put an end to the importation of foreign pianos. MM. Pleyel and Co. have also just obtained a patent for square pianos, with single strings. —*French Paper.*

Entomology.

Ingenuity of Spiders.—To our readers in general, and to entomologists in particular, we conceive that the following instance of ingenuity in a spider, which was witnessed by the writer of this article, will not be uninteresting.—A web was observed to be tightly stretched across a garden path, about five feet in breadth, the reticulated portion occupying the centre, and one of the principal threads to which this part was attached, had a vertical direction; upon examining in what manner this was fastened to the ground, it was found that the ingenious insect, instead of having permanently fixed it to the gravel path, had coiled it round a stone a little larger than its own body, and had raised this about a foot from the walk, where it was swinging in the air, giving the necessary degree of tension to the net-work of the web, but not offering a sufficient resistance to the wind to occasion its destruction.—*Monthly Magazine.*

Optics.

French Achromatic Telescope. The magnificent achromatic telescope constructed by the late M. Fraunhofer for the observatory at Dorpat, has awakened a strong spirit of emulation in France; and M. Cauchoix, a Parisian optician, has nearly completed an achromatic telescope, about 19 feet focal length, and of 12½ inches aperture, from some flint glass of the late M. Guinand. It is reported

* A carat is about four grains.

that some remarkable appearances have been observed with this instrument, in the ring of Saturn, by M. M. Arago and Mathieu, of the Royal Observatory at Paris; an account of which will be published when they shall have been fully verified. Have they seen the phenomenon remarked last year by Captain Kater,—viz. that the external ring consists of several concentric ones, of which an account appeared in this journal at the time.—*Ibid.*

Electricity.

ELECTRIC CURRENTS.—A. M. Nobili has presented a memoir to the Institute, on the exact measurement of the intensity of electrical currents. He hopes to establish a system of ascertaining them as easily, and as correctly, as the barometer ascertains the pressure of the atmosphere, and the thermometer the degree of heat. M. M. Amépre and Arago, are appointed to report on the important discovery.

LIST OF NEW PATENTS,

Sealed 1827.

PUMPS.—To Lieut. W. J. H. Hood, of Arundel Street, Strand, for improvements on pumps, or machinery for raising or forcing water, chiefly applicable to ships. To be enrolled by the 26th Nov. 1827.

WHEELED CARRIAGES.—To George Burges, of Bagnigge Wells, Middlesex, for improvements in wheeled carriages, &c. To be enrolled by the 26th Nov. 1827.

CARPETS.—To Thomas Clarke, of Market Harborough, Leicester, for improvements in manufacturing carpets. To be enrolled 26th Sept. 1827.

FLOORING.—To Malcolm Muir, of Glasgow, for machinery for preparing boards for flooring, and similar purposes. To be enrolled by the 1st August, 1827.

DEAD EYES.—To J. W. Clark, of Tiverton, for an improved mode of fixing the dead eyes to the channels and sides of ships. To be enrolled by the 8th Dec. 1827.

WIRE CARDS.—To J. C. Daniells, of Stoke, Wilts, for improvements in preparing wire cards, and dressing woollen and other cloths. To be enrolled by the 8th Dec. 1827.

CAPSTANS.—To Capt. Charles Phillips, R. N. of Rochester, Kent, for improvements on capstans. To be enrolled by the 8th Dec. 1827.

SEA TABLE APPARATUS.—To Lieut. Hugh Evans, of Great Surrey Street, and R. H. King, of Snow Hill, London, for a new table apparatus to promote the ease, comfort, and economy of persons at sea. To be enrolled by the 12th Dec. 1827.

LIST OF EXPIRED PATENTS,

Cont. from p. 432, *1st Series of this Work.*

SPINNING.—To Joseph Rayner, of Sheffield, for improved machinery for winding and spinning cotton, silk, flax, and wool.

SHEARS.—To W. Wilkinson, Grimesthorpe, for improved horse, wool, and glovers' shears.

FENDERS.—To Thomas Ryland, Birmingham, for a fender for fire-places.

APPLICATION OF MANUAL LABOUR.—To John S. Norris, of Kennington, for a machine, to enable a man to use his strength with greater effect, in giving rotary motion to any engine.

IMPERVIOUS CASKS, &c.—To Rob. Dickenson, London, for improved vessels for holding liquids.

LINT.—To Wm. Bundy, Camden Town, for a new manufacture of lint.

CALICO PRINTING.—To M. Bush, Longford, for improvements in printing calicos.

WINDMILLS.—To Wm. Allen, London, for improved machinery to be worked by wind.

WASHING MACHINE.—To R. Cawkwell, Newark upon Trent, for an improved washing machine.

HARPS.—To C. Groll, and F. Dizi, London, for improvements on harps.

SAW-MILLS.—To Mark I. Brunel, Chelsea, for improvements in saw-mills.

MARINERS' COMPASSES.—To Francis Crow, Feversham, for improvements in the mariners' compass.

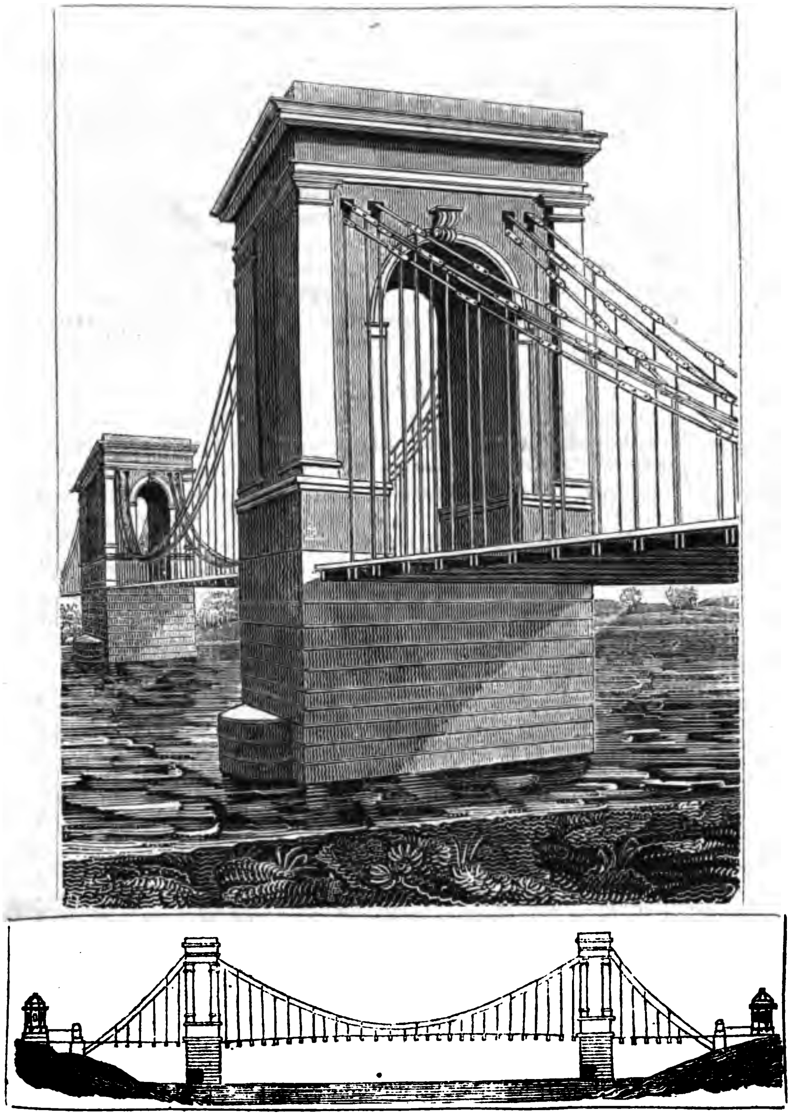
STEAM ENGINES, &c.—To Robert Donkin, Penzance, for lessening the consumption of steam, and for other machinery employed for various purposes.

TO OUR READERS AND CORRESPONDENTS.

MR. GUTTERIDGE's interesting communication was intended for our present Number, but is reserved until the next, for want of room.

FLY-WHEEL's "best friend," will shortly be introduced to the notice of our readers.

H. R. S. and PLOUGHSHARE are unavoidably postponed.



A Perspective View and Front Elevation of the

NEW SUSPENSION BRIDGE, AT HAMMERSMITH.

Descriptive Account of the Suspension Bridge now erecting at Hammersmith,

*Communicated by Mr. C. Davy.**

IRON Bridges, the invention of which is due to British ingenuity, are entirely the production of modern times. The first bridge was erected by Mr. Darby over the river Severn, at Colebrook Dale, and affords a splendid example of the art and of the engineer's talents. In 1808 an iron bridge was constructed at Staines, but by some unforeseen circumstance the arch received so much damage by settlement that it was found necessary to remove great part of the iron work, and shore the remainder up by piers constructed of wood. About this time another iron bridge, erected over the river Tees, gave way; but this, instead of yielding gradually, as the bridge at Staines had done, suddenly broke down and fell into the river. Through the perseverance and talent, however, of Captain Brown, R. N. the art of bridge building on the suspension principle, has been eminently successful. But Suspension Bridges are said to have been in use before the time of Scamozzi, the architect, who mentions the existence of them in his work, Del Idea Archi, 1615. It appears the first erected in this country was over the river Tees, about the year 1741, and formed a communication between the counties of Durham and York. Since that time the number of these structures have been increasing; and we may now boast of having some of the finest examples. These have been followed by an attempt to introduce bridges on the suspension principle, composed of iron wire, which, on a small scale, no doubt will answer; but if of great magnitude, vibration is caused to such an extent as to render them unsafe. The wire bridge of Dryburgh, through some mischievous persons shaking it violently, had one of the largest radiating chains broken short off at the point of suspension: shortly after the injury was repaired, a high wind again broke the chains, and completely effected the destruction of the bridge. From the evidence of many people at the time it appeared, that in this gale the vertical motion of the roadway was equal to its lateral motion, and was sufficient to precipitate a person into the river.

The Suspension Iron-bar Bridge now erecting over the Thames, at Hammersmith, may justly vie, in point of beauty, with the most celebrated of these structures. The clear extent of the water-way is 400 feet, from which the road-way rises 16 feet; the points of suspension are built of stone, and designed as archways of the Tuscan order, flanked by pilasters; and the part near the water is boldly rusticated; these supports are 50 feet high from the road, the thickness is 22 feet; on either ends of the bridge, at its entrance, are octagonal lodges, from which project to a small distance dwarf walls, terminated by short circular-headed piers, as shown in the elevation on the other side; at a great depth behind these piers the ballast plates, O, fig. 3, are fixed.

The principle of construction is as follows:—D D, fig. 4, are the

* Teacher of Drawing at the London Mechanics' Institution, and at No. 11, Furnival's Inn.

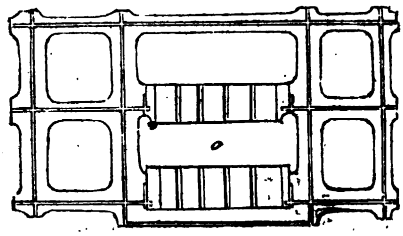


Fig. 3.

Fig. 4.

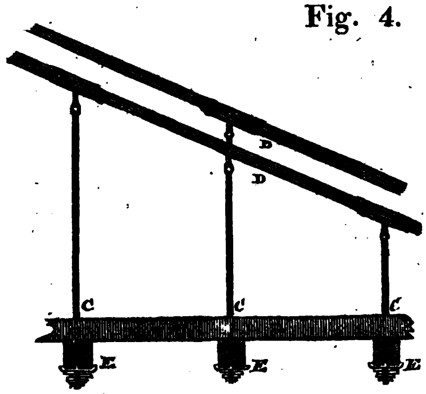
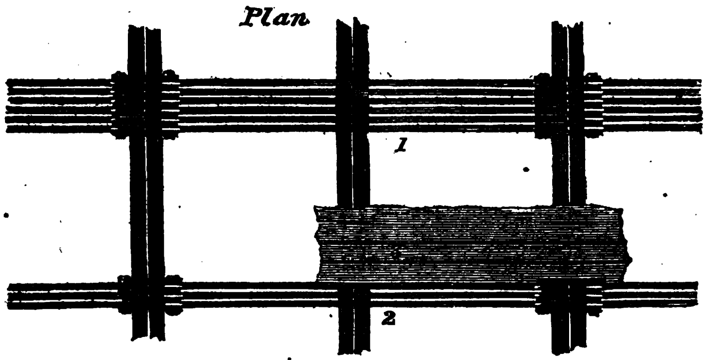


Fig. 5.



suspension chains, which consist of bars of iron, 5 inches deep by 1 in thickness; these are 10 feet in length, and connected together as shown in the annexed plan, by plates of iron having a strong bolt passing through and turned at the ends; these plates are placed alternately on the lower and upper chains, by which means a suspension rod, *c c*, 1¼ in. thick, occurs at every 5 feet, and these saddle pieces or plates, (1 and 2, fig. 5,) at every 10 feet, on the lower and upper chains; the plates of the upper chain standing exactly half way between the plates of the lower chain. The suspending rods are furnished with a joint, where they are inserted into the opening

between the chains or plates, enabling them to accommodate themselves to any extraordinary weight on the bridge. There are two pairs of chains on each side of the bridge; the inner pair consists of six links, the outer ones have only three links each, (as represented in figure 5.) At the height of about 30 or 40 feet from the level of the road, the chains pass through the masonry of the arches before mentioned, and pass over friction rollers connected to heavy cast-iron plates; the catenarian curve drops in the centre of the bridge to about the height of a parapet: the spaces between the suspension rods will, eventually, be filled with an ornamental meshing. The road-way consists of transverse beams in two thicknesses, 4½ by 12 inches, with an interval of 2½ between them; these are fastened at the bottom by keys to strong iron plates; along each side of the bridge extend a pair of strong beams, which are firmly bolted to the flooring joists; this connection is shown at *e e*, fig. 4. The roadway of the bridge is slightly raised towards the centre of the river, and the whole is boarded longitudinally with 3 in. planks, (as shown at 3,) with a small space left between each to prevent any water from settling upon the bridge.

The architectural beauty given to the masonry of this bridge is a decided improvement in the hitherto clumsy masses of stone introduced in other erections of this description, and forms a highly ornamental appendage to the river Thames.

DISCOVERIES IN THE ARCTIC REGIONS.

WE have the satisfaction of laying before our readers in the present No. some very important information respecting Captain Franklin's expedition of Discovery on the northern coast of the American Continent.

In 1825, and until June, 1826, Captain Franklin was occupied in surveying the Great Bear Lake, where he fixed his head quarters, and the parts adjacent, to the Mackenzie River. At this time he proceeded down the Mackenzie for the purpose of surveying the coast, and proceeding westward as far as Icy Cape, where he expected to meet with Captain Beechey, in the Blossom, which was sent by Government up the Pacific, with the view of proceeding east of Icy Cape to meet the overland party. Captain Franklin was accompanied in this undertaking by Dr. Richardson, who, with one division of the expedition, proceeded eastwards of the Mackenzie River, while he (Capt. F.) took a westward course.

" At this place, named Parting Point by Captain Franklin, the river divides into a number of widely diverging branches, separated from each other by low and partially flooded lands. It was determined that the two divisions of the expedition should separate here, and that each party should follow the channel which accorded best with their respective routes. Captain Franklin, in the preceding autumn, had descended a middle channel, and reached the seat at Garry's Island, in lat. 69 deg. 30 min. N. long. 135 deg. 45 min. W. He now entered the most westerly arm, which winds round the base of the Rocky Mountains, and reached its mouth on the 7th of July. Its outlet is so barred by sand-banks, that the crews were compelled to drag the boats for miles, even at the top of high water.' In this unpleasant situation they were visited by a large party of Esquimaux, who at first behaved quietly, and carried on a barter in an amicable manner: but at length, prompted by the desire of plunder, and confiding in the superiority of numbers, on a pre-concerted signal, upwards of two hundred stout fellows, armed with long knives, rushed into the water at once, and seizing on the boats, dragged them on shore. The judicious measures pursued by Captain Franklin, however, well seconded by the prompt obedience and determined conduct of Lieutenant Back and the crews of the boats, rescued the provisions and all the property of consequence from the hands of these freebooters, and the boats were ultimately got afloat without a shot having been fired, or any personal injury received on either side. The same party came twice that night and next day with hostile intentions, when the expedition had put ashore to repair the rigging of the boats, which had been cut in the affray; but the posture of defence in which Captain Franklin drew up his small force, deterred them from renewing the attack. The smaller parties of Esquimaux, that were subsequently met with, on the sea-coast, behaved in a friendly manner. On the 9th of July, Captain Franklin was stopped by ice, unbroken from the shore, and from that date up to the 4th of August, he could advance only as the separation took place, and seldom more than a mile or two a day

In this tedious way he reached the 141st degree of longitude, by which time the ice had given way so as to give a passage to the boats; but other obstacles, of a most serious nature, now opposed themselves to his progress. The coast was so low, and difficult of approach, from the shallowness of the water, that a landing on the main shore was effected only once, after passing the 139th degree of longitude, though it was frequently attempted, by dragging the boats for miles through the mud. On all other occasions, he had to land on the naked reefs that skirt the coast, where, after the departure of ice, the party suffered severely from the want of fresh water, and once passed two entire days without that necessary article Thick fogs, and heavy gales of wind, prevented the expedition from quitting this inhospitable part of the coast, and it was detained on one spot for eight days, by a fog so dense, that all objects were obscured at the distance of a few yards; stormy weather prevailing all the time. Notwithstanding these almost insurmountable obstacles, the resolution and perseverance of Captain Franklin and his party, enabled them to reach nearly the 150th degree of longitude by the 18th of August. They had then performed more than half the distance, along the coast, to Icy Cape; had plenty of provisions, boats in good order, and an open sea before them; and although, from the fatigues they had undergone, the strength of the crews was somewhat impaired, yet their spirit was unbroken: but the period had now arrived, when it was Captain Franklin's duty, in pursuance of his instructions, to consider the probability of his being able to reach Kotzebue's Sound before the severe weather set in; and, if he did not expect to attain that object, he was prohibited from hazarding the safety of the party by a longer continuance on the coast. It would have been the extremity of rashness to have attempted to reach Kotzebue's Sound, by traversing an unknown coast at that advanced season, even had he been certain that the Blossom had reached that place; but the uncertainty attending all voyages in high latitudes, made it extremely doubtful whether that vessel was actually at the rendezvous or not. It was, therefore, in conformity with Captain Franklin's usual judgment, and the almost paternal anxiety he has always evinced for the safety of those who have had the happiness to serve under his command, that he decided upon commencing his return to Bear Lake at that period."

Immediately after this the weather is stated to have become exceedingly stormy, so that, in all probability, the party owed their safety to this well-timed return; which is fortunate on another account, as they received intelligence that the Esquimaux and Mountain Indians had made preparations to attack them.

"With regard to the eastern detachment of the expedition, on parting from Capt. Franklin, they pursued the easternmost channel of the river, which is that by which Mackenzie returned from the sea, and is accurately and ably described by him. They reached the sea on the 7th of July, in lat. 69 deg. 29 min. N., long. 128 deg. 24 min. W., having, on that day, fallen in with a horde of Esquimaux, who, whilst the boats were in a similar situation to Captain Franklin's, aground on the flats at the mouth of the river, endeavoured to seize upon Mr. Kendall's boat, no doubt for the purpose of plundering it. The attempt, however, which was, perhaps, merely the impulse of the moment, was not participated in by the whole horde, and was instantly frustrated by the cool courage of Mr. Kendall, and the determined attitude assumed by the party, without the necessity of having recourse to violence. They gave no farther trouble, and the party left them with the shew at least of friendship. The parties of that nation, which were met afterwards, being inferior in number to the expedition, were very civil. They displayed, however, much courage in opening an intercourse. After reaching the sea, considerable difficulty was experienced, in coasting a shore of a very peculiar nature, to lat. 70 deg. 37 min. N., long. 126 deg. 52 min. W. The coast, thus far, consists of islands of alluvial (or, perhaps, in the present language of geologists, of diluvial) origin, skirted by sandy banks running far to seaward, and intersected by creeks of brackish water, and separated in part by wide estuaries, pouring out at that season of the year large bodies of fresh water. These alluvial lands are inundated by the spring floods, and covered with drift timber, except a number of insulated mounds of frozen earth, which rise considerably above the highest water-mark, and are analogous to the frozen banks or icebergs described as bounding Kotzebue's Sound. Betwixt them and the main shore there is a very extensive lake of brackish water, which perhaps communicates with the eastern branch of the Mackenzie, and receives at least one other large river. This party subsequently tracked a rocky and bolder shore, rounded Cape Parry in lat. 70 deg. 18 min. N., long. 123 deg. W., Cape Krusenstern in lat. 68 deg. 46 min. N., long. 114 deg. 45 min. W., and entered George the Fourth's Coronation Gulf, by the Dolphin and Union Straits, which brought them nearly to the 113th deg. of west longitude. They then steered for the Coppermine river, and entered it on the 8th of August. They suffered some detention on this voyage, from bad weather, and had on several occasions to cut a passage through tongues of ice with the hatchet, and to force a way for the boats with much labour and some hazard. The ice attains a great thickness in that sea, some of the floes being aground in nine fathoms water; but under the powerful radiation of a sun constantly above the horizon, in the summer months, it decays with an almost incredible rapidity. As the boats drew only twenty inches of water, the party were, on several occasions, enabled to sail through shallow canals, worn on the surface of these floes by the action of the waves, when, from the ice being closely packed on the shore, they could find no passage betwixt the masses of which it was composed. They had fortunately clear weather for these attempts. Had they experienced the fogs which Captain Franklin met with to the westward, they must of necessity have remained on shore. Notwithstanding the quantity of ice they encountered thus early in the season, they were convinced that towards the *end of August there is a free passage for a ship along the northern coast of America, from the 100th to the 150th degree of west longitude;* and to the eastward of the Mackenzie there are some commodious harbours, although there are none on the part of the coast surveyed by Captain Franklin to the westward. The whole difficulty in performing the north-west passage in a ship, seems to be in attaining the coast of the continent through the intricate straits which lead from Baffin's or Hudson's Bays. The flood tide was found setting every where along the coast from the eastward. The rapids, which obstruct the navigation of the Coppermine, prevented

them from bringing their boats above eight miles from the sea, and they therefore abandoned them there, with the remainder of their stores, tents, &c. a present to the Esquimaux, and set out overland to Fort Franklin, carrying (exclusive of instruments, arms, and ammunition, and a few specimens of plants and minerals,) merely a blanket and ten days' provisions for each person. They arrived on the eastern arm of Bear Lake on the 18th of August, and at the Fort on the 1st of September, after an absence of seventy-one days, in excellent health and condition. The two branches of the expedition have thus surveyed the coast through upwards of 36 degrees of longitude, which, together with Captain Franklin's former discoveries and those of Captain Parry, render the Arctic Sea pretty well known, as far as the 150th degree of west longitude. There remains only 11 degrees of unknown coast betwixt that and Icy Cape; and Captain Beechey has, perhaps, by this time, traced a considerable portion even of that, in the Blossom; so that a complete discovery of the north-west passage, so long an object for which Britain has contended, is now brought within very narrow limits."

For the foregoing account we are principally indebted to the American Journals. Some interesting intelligence has been received of Capt. Beechey's expedition, which we must reserve until our next for want of room.

ON THE PROPERTIES OF STEAM,

Of various temperatures and densities.

To the Editor.

Sir,—My attention having been drawn to the examination of one or two important inventions, for the production and use of highly elastic steam, and being desirous of investigating the probable advantages to result from their use, I have been surprised at the scantiness and unsatisfactory nature of the information which exists upon the subject, among scientific people; for which I can only account, by supposing, that the use of very strong steam has hitherto been considered impracticable. This, however, is a supposition which cannot any longer be entertained; and I can hardly imagine any more useful service which our scientific men can render to the arts, than a careful and philosophical investigation, into the nature and properties of steam, at various densities.

I find it asserted in Dr. Arnott's excellent book, that the density of steam is greater, always, exactly as its force is greater, and that the heat absorbed in its formation, is proportioned to the density; so that the force, and the cost in caloric or fuel, have always the same relation to each other, at whatever density the steam is put to use. In opposition to this, it has been asserted by Mr. Tredgold, that greater quantities of caloric are expended in the conversion of water into steam at high pressures, than when generated at atmospheric pressure. Mr. Tredgold gives us the following table on the subject.

Temperature of steam.	Atmospheric pressure.	Quantity of coal required to convert 1 cub. foot water into steam.
212	1	8.5lbs.
250	2	8.87
275.8	3	9.16
292.8	4	9.37
307.7	5	9.55
320.2	6	9.7
343.6	8	9.98

I likewise find it asserted by Mr. Dalton, that the density is not proportioned to the pressure, but that steam of 50 atmospheres elastic force, has only the density of 34 atmospheres; in other

words, that a pint of steam at 50 atmospheres pressure, contains only 34 times the quantity of water which is contained in a pint of atmospheric steam. Here we have three most respectable authorities, all contradicting each other upon a point of considerable importance, and which could very speedily be set to rest.

It has been asserted, that 1000° of heat become latent, in converting boiling water into steam, a theory which appears borne out by the well established fact, that a pint of water, in the form of steam, will combine with, and raise within 1 or 2 degrees of the boiling point, six pints of cold water. If, then, Dr. Arnott is correct, 1212 degrees of heat are absorbed in the generation of steam at atmospheric pressure, 2424 degrees are required for steam at 2 atmospheres pressure, 3636 at 3 atmospheres pressure, and so on, the degrees of heat increasing in arithmetical progression, proving thereby, that a greater proportion of the heat becomes latent in the production of steam, with each increase of its density, since we know, that the degrees of free heat do not increase in equal proportions to the densities.

It would much surprise me, if experiments properly conducted, did not prove the truth of Dalton's theory, viz. that the increments of caloric, both free and latent, do not bear any proportion to the increase of density and pressure in highly elastic steam, since the thermometric heat does not increase in proportion to the density, and the phenomenon which occurs at the moment of relieving dense steam from pressure, would seem to indicate, that it does not contain an equal or proportional degree of latent heat, as a large portion of its free heat is taken up and rendered latent, in the act of its expansion.

These remarks may perhaps serve to draw the attention of some of your scientific readers, to so important a subject, and induce them to give the result of their reasonings and experiments to the world.

Your obedient Servant,

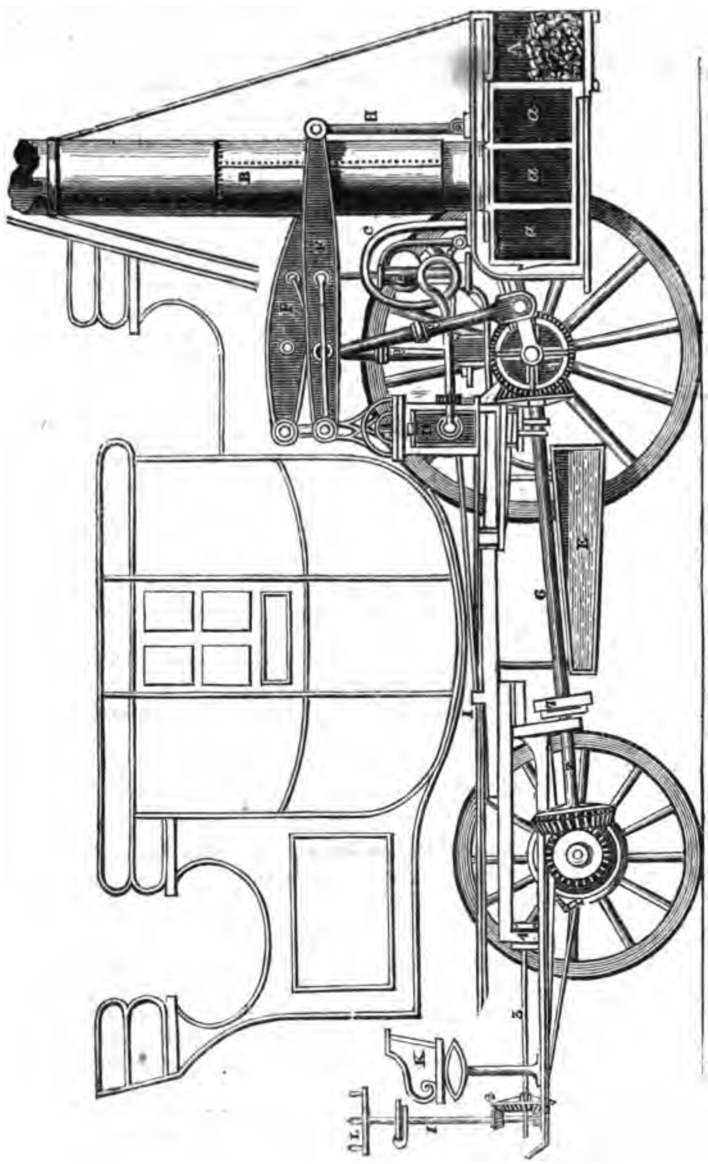
London, 9th July, 1827. E. N. R.

LOCOMOTIVE STEAM COACHES,

By Messrs. Burstall and Hill, described under two Patents.—*Enrolled August*, 1825, and *June*, 1827.

As we propose introducing in our next number * a particular description of the *recent* improvements made by the patentees in the construction of locomotive carriages, we have thought the present a proper opportunity to insert an account of their *first* effort to attain that important desideratum, of rendering steam power available for propelling carriages on ordinary roads, which was the subject of a

* Since writing the foregoing, we have re-perused the specification of Messrs. Burstall and Hill's Second Patent, by which it now appears to us that the Improvements described therein may be sufficiently explained without the aid of illustrative diagrams, as they are few in number, and of a simple description; accordingly we annex an account of them here.



patent enrolled nearly two years ago. Our drawing of this subject was prepared about 18 months since, but having been mislaid, other inventions have (unintentionally by us) taken precedence of it. The description is, however, necessary, as the inventors have in their late patent retained the greater part of the arrangements contained in the former,—these are as follow:

A represents the boiler, which is formed of a stout cast-iron or other suitable metal flue, inclosed in a wrought-iron or copper case, as seen in section where A is the place for fuel, and *a a a* are parts of the flue, as seen in section; the top being formed, into a number of shallow trays or receptacles for containing a small quantity of water in a state of being converted into steam, which is admitted from the reservoir by a small pipe. B is the chimney, arising from the centre flue; at D are the two cylinders, one behind the other, which are fitted up with pistons and valves or cocks, in the usual way, for the alternate action of steam above and below the pistons. The boiler being suspended on springs the steam is conveyed from it to the engines through the helical pipe, *c*, which has that form given to it to allow the vibration of the boiler without injury to the steam joints. E is the cistern, containing water for one stage, say 50 to 80 gallons, and is made of strong copper, and air-tight, to sustain a pressure of about 60 pounds to the square inch. At *e* is one or more air pumps, which are worked by the beams, F F, of the engines, and are used to force air into the water vessel, that its pressure may drive out, by a convenient pipe, the water into the boiler, at such times and in such quantities as may be wanted. The two beams are connected at one end with the piston-rods, and at the other with the rocking standards, H H. At about one-fourth of the length of the beams from the piston-rods, are the two connecting rods, *g g*, their lower ends being attached to two cranks, formed at angles of 90° from each other on the hind axle, giving, by the action of the steam, a continued rotatory motion to the wheels, without the necessity of a fly wheel. The four coach-wheels are attached to the axles nearly as in common coaches, except that there is a ratchet-wheel formed upon the back part of the nave, with a box wedged into the axle, containing a dog or pall, with a spring on the back of it, for the purpose of causing the wheels to be impelled when the axle revolves, and at the same time allowing the outer wheel, when the carriage describes a curve, to travel faster than the inner one, and still be ready to receive the impulse of the engine as soon as it comes to a straight course.

The patentees have another method of performing the same operation, with the further advantage of backing the coach when the engines are backed. In this plan the naves are cast with a recess in the middle, in which is a double bevil clutch, the inside of the nave being formed to correspond. These clutches are simultaneously acted upon by connecting levers and springs, and which, according as they are forced to the right or left, will enable the carriage to be moved forward or backward. To the fore naves are fixed two cylindrical metal rings, round which are two friction bands, to be tightened by

a lever convenient for the foot of the conductor, and which will readily retard or stop the coach when descending hills. K is the seat of the conductor, with the steering wheel, L, in the front, which is fast on the small upright shaft, 1, and turns the two bevil pinions, 2; and the shaft, 3, with its small pinion, 4, which, working into a rack on the segment of a circle on the fore carriage, give full power to place the two axles at any angle necessary for causing the carriage to turn on the road, the centre of motion being the perch-pin, I.

The fore and hind carriage are connected together by a perch which is bolted fast at one end by the fork, and at the other end is secured by two collars, which permit the fore and hind wheels to adapt themselves to the curve of the road.

To ascend steep parts of the road, and particularly when the carriage is used on railways, or to drag another behind it, greater friction will be required on the road than the two hind wheels will give, and there is therefore a contrivance to turn all the four wheels. This is done by the pair of mitre-wheels, 4, one being on the hind axle and the other on the longitudinal shaft, 6, on which shaft is a universal joint directly under the perch pin, I, at 7. This enables the small shaft, 7, to be turned, though the carriage should be on the lock. On one end of the shaft, 7, is one of a pair of bevil wheels, the other being on the fore axle, which wheels are in the same proportion to one another as the fore and hind wheels of the carriage are, and this causes their circumference to move on the ground at the same speed.

The patentees, by a peculiar construction of a boiler, intend to make it a store of caloric; they propose to heat it from 250 to 600 or 800 degrees of Fahrenheit: and by keeping the water in a separate vessel, and only applying it to the boiler when steam is wanted, they hope to accomplish that great desideratum in the application of steam to common roads, of making just such a quantity of steam as is wanted; so that, when going down hill, where the gravitating force will be enough to impel the carriage, all the steam and heat may be saved, to be accumulating and given out again at the first hill or bad piece of road, when, more being wanted, more will be expended.

The engines are what are called high-pressure, and capable of working to 10-horse power; and the steam is purposed to be let off into an intermediate vessel, that the sound emitted may be regulated by one or more cocks.

From the foregoing description we think we are warranted in saying that there is a considerable degree of ingenuity, as well as originality, in many of the details, and also in the general arrangement of the machinery. In this light we regard their mode of allowing the several wheels to move simultaneously at different velocities, the convoluted form given to the steam and water pipes, (by which the injurious effects of jolting are avoided by very simple means,) and the mode of injecting water into the boiler by means of compressed air.

By the *recent* improvements, the boiler is to be placed upon an additional pair of wheels, so that the whole machine may run upon six wheels instead of four. The patentees claim two distinct modes of

employing this extra pair of wheels, either of which may be adopted. By the first mode the back end of the boiler is bolted to the axletree of the extra wheels, and the front end rests and turns upon a pivot, fixed to the axle of the middle pair of wheels. By the second mode, the axle of the hind wheels turns upon a centre, and the boiler is attached to a frame, which encompasses it: this frame is suspended upon springs or not, (according to the nature of the road,) the fore part of it being bolted to the axle of the middle pair of wheels; by either of these contrivances the boiler and its carriage may be made to adapt itself to bends in the road, without incurring injurious strains.

The next improvement of material importance, consists in the construction of the steam pipes, which have sliding and moveable knee-formed joints, to admit of their extension or contraction, when the carriage is passing over rough or undulating ground; thus constructed, the pipes also accommodate themselves to bends and irregularities in the road.

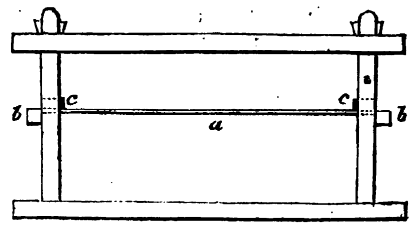
The third improvement relates to the mode of steering the carriage, which is effected by a chain circumscribing the steering wheel, the ends of the chain then passing round pulleys fixed on the carriage frame, are attached to the opposite extremities of the fore axle-tree.

Preparations are nearly completed for exhibiting this carriage and its operation, in a piece of ground, engaged for that purpose, near the New Bethlehem Hospital.

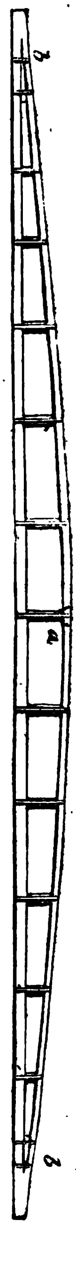
NEW RAFTER.

And Experiments on the Transverse Strength of Timber.

In one of our recent perambulations in quest of new discoveries in practical mechanics, we happened to call at the manufactory of the ingenious Mr. Smart, inventor of the Bow and Spring Rafter (described at vol. i. page 357 of the first series of this work,) and found that he had just completed a rafter 56 feet long on the same principle, but of improved construction. Some time ago Mr. Smart was induced to institute a series of experiments on the strength of materials, from a doubt which he entertained of the correctness of the results of Belidor's experiments on the transverse strength of timber, where it is stated that the strength of a beam is increased by fastening its ends, so as to prevent their approach when a load is placed in the middle, is in the proportion of three to two. To ascertain the correctness of this, Mr. Smart placed a lath *a* an eighth of an inch thick, into a strong frame, as shewn by the annexed cut, which broke with a load of eleven pounds, placed on its middle. He next took a lath of the same wood, of



equal dimensions, and fixed it firmly at the ends by means of the projecting pieces *b*, *b*, and the wedges *c*, *c*, and ascertained that it would sustain by this arrangement the enormous load of 270 pounds: hence it appears that the strength of a lath is increased between twenty-four and twenty-five times, merely by securing it well at the ends.



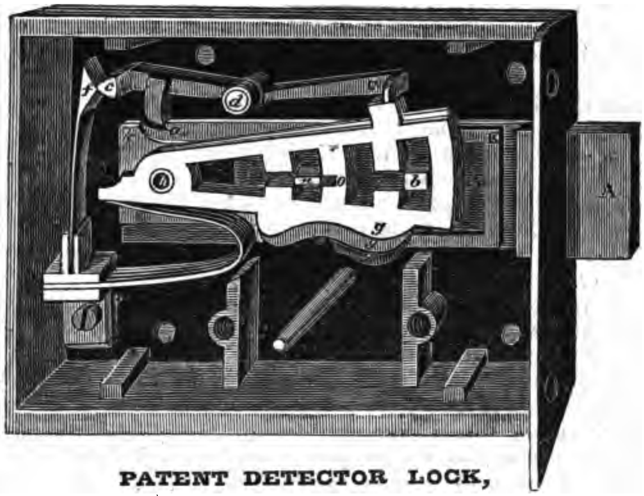
This important discovery was turned to account by Mr. Smart in the construction of rafters, which he denominates Bow and String Rafters. He considered that the principal defect in fixing the ends of rafters was for want of sufficient stability in their supports, and he has contrived to make the abutments within the rafter itself, and thus take advantage of the longitudinal strength of the timber, as represented in the annexed figure. This rafter, which is 56 feet between the bearings, is made out of a scantling 10 inches by 4 inches. An incision is made by a circular saw from the middle nearly to each end: a transverse cut is then made at *a* through the middle of the upper part of it; and at each end *b b* of the incision, a transverse piece, of a wedge shape, is cut out, reaching nearly to the longitudinal incision, but not so near as to separate the parts.

Roofs, constructed on this principle, possess many advantages, among which may be enumerated their extreme lightness, their flatness, and the economy of their erection: and we think the invention may be safely characterized as one of the most important and valuable in the art of building in modern times.

Geographical Discoveries.

Major Laing.—At a recent sitting of the Académie des Sciences, M. Jomard, the president, stated that letters had been received from Mr. Warrington, Major Laing's father-in-law, and the English consul at Tripoli, adverting to a report of Major Laing's death, but adding, that it was without foundation. M. Jomard also announced, that a letter dated the 5th May, had been written to M. Arago, by the Baron de Humboldt, who observed in it, that according to the accounts of some Moorish merchants who had arrived at Tripoli, Major Laing and Captain Clapperton had succeeded in meeting at Tombuctoo, and were living there very quietly.

Voyage of Discovery.—Letters have been received, announcing the arrival at Port Jackson, in December last, of the French expedition of discovery, under Capt. Durville.



PATENT DETECTOR LOCK,

With the recent Improvements, by CHARLES CHUBB, 57, St. Paul's Church-yard.

THE following account of this invention we have received from the ingenious patentee; and, as it relates to some very desirable and perfectly original improvements in the construction of locks, we deem it necessary to give it insertion in our work, notwithstanding it has already received considerable publicity.

A A *a*, the bolt; *b*, the square pin of the bolt; *c c*, the detector, moving on the centre, *d*; *f*, the detector spring; *g*, four tumblers, moving separately on the centre, *h*, shown lifted by the key, to the exact position for the square pin, *b*, of the bolt to pass in unlocking. Should one or more of the tumblers be lifted, by a pick or false key, in the least degree, beyond their present position, the detector, *c c*, being thus overlifted, will, by the angle of the spring, *f*, pressing on the opposite side of the angle of the detector, force its hook into the notch, *a*, of the bolt, and be firmly held so, until disengaged by the regulating slide, K *k*; in which case, by the introduction of the key, the tumblers are lifted to the regulating combination, and admit the stud, *n*, affixed to the regulating slide, to enter the several grooves, *o*, in them; the bevilled end, *k*, of this slide, by the same movement, pressing against the hook of the detector, disengages it from the notch, *a*, of the bolt.

The patent detector locks possess in a much higher degree than any other, the four principal requisites of a good lock, viz. *security*, *simplicity*, *strength*, and *durability*. Its *security*, particularly, is increased beyond calculation by an improvement, which not only renders it impossible to be picked or opened by *any* false instruments, but also *detects the first attempt* to open it; thereby preventing those *repeated efforts*, to which even the best locks hitherto invented are exposed. In these locks the combinations admit of so great variety,

that many thousands of them may be made, and yet one key shall not pass any two locks: and the *detector* renders that variety infinite; for the instant that one or more of the tumblers are lifted beyond the place where the bolt is at liberty to pass, it overlifts the detector which then hooks the tail of the bolt, preventing it from passing, and thus gives incalculable additional security, (as well as immediate notice the first time the true key is put into it to open it, that an attempt has been made to pick it,) and renders all farther attempts useless; it being *impossible* to discover the *first* combination, to disengage the detector; or the *second*, to remove the bolt; and nothing but the true key can either release the detector from its grasp on the bolt, or open the lock.

In reference to its *durability*, it is not liable to be injured by constant use in any length of time; this has been ascertained, by an iron-rim lock having been attached to a steam engine in the Dock Yard, Portsmouth, (to try the effect of friction,) by which it was locked and unlocked upwards of four hundred and sixty thousand times, without receiving the least injury. The *strength* of its parts, and the *simplicity* of its construction, are such, that no False Key, or other Instruments introduced into it for the purpose of opening it, can (without very great violence) injure it.

SCIENTIFIC INSTITUTIONS.

Royal Institution.—July 14th. Dr. Harwood, Professor of Natural History to the institution, concluded his course of Lectures on Reptiles, which has been illustrated throughout by beautiful specimens belonging to the professor. This lecture terminated the lectures at the Institution for the season.

London University.—The Council have appointed the following professors:

Greek Language and Literature. George Long, A. M., Fellow of Trinity College, Cambridge, Professor of Greek at the College of Charlotteville, America.

Natural Philosophy and Astronomy. Dr. Lardner, of Trinity College, Dublin.

Botany and Vegetable Physiology. Dr. Hooker, Professor of Botany, Glasgow.

Physiology, Morbid and Comparative Anatomy. Dr. Meckell, Professor of Anatomy and Physiology, University of Halle.

Anatomy. Dr. Patterson, Professor of Anatomy and Surgery, College of Baltimore.

Materia Medica and Pharmacy. Dr. A. T. Thompson.

Nature and Treatment of Diseases. Dr. Conolly.

Jurisprudence and Law of Nations. J. Austin, Esq., Barrister at Law.

English Law. A. Amos, Esq., Barrister at Law.

Political Economy. J. R. Mac Culloch, Esq.

Zoology. Dr. R. E. Grant.

It is expected that several other appointments will immediately take place, and the remainder in November next.

London Mechanics' Institution.—July 11, Mr. Brayley commenced his course of lectures on the anatomy and physiology of the Invertebrate Animals. The lecturer, who seemed quite familiar with his subject, made the lecture, which was illustrated by a great variety of fine specimens and beautiful transparencies, highly instructive and interesting. He concluded by apologizing for having been too systematic in his arrangement, but he considered that instruction in detached portions was too apt to make us fancy our knowledge to be more extensive than it really is; whereas, by laying the whole system of any department before us at once, we could discover how little we knew, and how much we had to acquire.

July 13, Mr. Dowling concluded his lectures on arithmetic; when it was announced by the chairman, that on July 25, Mr. Brayley's second lecture would be delivered, and the course continued each succeeding Wednesday; and that on July 20 and 27, Mr. Smith would deliver two lectures on Mnemonics.

Western Literary and Scientific Institution.—The managers of this institution have recently removed into the extensive premises in Leicester Square formerly occupied by Sir Joshua Reynolds. The premises are commodious, and well adapted for the purposes of the institution: the apartment used by Sir Joshua Reynolds as a picture gallery, has been converted into a lecture room, which will be ready for use in a few weeks.

Southwark Mechanics' Institution.—The first anniversary meeting of the members took place at the lecture room of the institution, in Crosby Row Chapel, on Wednesday the 11th instant, Dr. Birkbeck in the chair. By the report of the committee, which was read and unanimously received, it appeared that the number of members had not increased according to the expectation of the committee, but that the state of the funds was favourable, there being a balance in hand of 43*l.* 14*s.* 8*d.* after every demand had been paid. Thanks were voted to J. Skirrow, Esq., for auditing the accounts; to Mr. Beale, the honorary librarian; to Messrs. Kirby, Preston, and Phillips, for gratuitous lectures; to Mr. Peake, honorary secretary; to James Horne, Esq., president; and, finally, to Dr. Birkbeck, for his patronage and able conduct in the chair. The doctor in reply observed, that bad health had prevented his previous attendance, but that in future he should endeavour to make up the deficiency. He regretted that the committee should be any way discouraged by the non-increase of the members. He was not at all discouraged by it; on the contrary, he hailed as an omen of success the existence of the institution for upwards of twelve months. He was convinced that the prejudices against such institutions would soon disappear. He disclaimed the idea of their becoming in any way political. The promoters had far superior views, namely, the diffusion of useful knowledge, and teaching the humble to become wise. He earnestly recommended the establishment of a class of mutual instruction, as an economical method of acquiring information, and of qualifying themselves to deliver occasional lectures to their fellow-members.

Rural Economy.

To Preserve Seeds.—The following has been recommended as a certain preventive against birds taking seeds out of the ground in gardens, &c. Mix together 1lb. of gas tar, ¼lb. of brown spirits of tar, and ¼lb. of grease; into this dip some shoemaker's thread or twine, and draw it several times over the newly sown beds, supported a few inches from the earth on the tops of sticks.

Budding.—In the Agricultural Journal of the Pays Bas, it is recommended to reverse the usual mode of raising the bark for inserting the buds, and to make the cross cuts at the bottom of the slit, instead of the top, as is generally done in Britain. The bud then rarely fails of success, because it receives sufficient of the descending sap, which it cannot receive when it is under the cross cut.

Useful Arts.

Mode of Silvering Ivory.—Immerse a slip of ivory in a weak solution of nitrate of silver, and let it remain till the solution has given it a deep yellow colour: then take it out, and immerse it in a tumbler of clear water, and expose it in water to the rays of the sun. In about three hours the ivory acquires a black colour; but the black surface on being rubbed soon becomes changed to a brilliant silver.

Cheap Paint.—Gas tar mixed with yellow ochre, makes an excellent green paint, well adapted for preserving coarse wood work, and iron rails.

LIST OF NEW PATENTS,

Sealed 1827.

SHUTTERS AND BLINDS.—To Thomas Don and Andrew Smith, of White Lion Street, Pentonville, for making shutters and blinds of iron or steel, or any other metals; and improved methods of constructing and fixing shutters and blinds, or of uniting in the same the double properties of shutters and blinds. To be enrolled by the 15th Aug. 1827.

DRESSING FLAX.—To Solomon Robinson, of Leeds, Yorkshire, flax dresser, for improvements in machinery for hackling or dressing, and clearing hemp, flax, and tow. To be enrolled by the 16th Dec. 1827.

SPINNING.—To Lambert Dexter, of King's Arms Yard, Coleman Street, London, for certain improvements in machinery for the purpose of spinning wool, cotton, and other fibrous substances. To be enrolled by the 16th Dec. 1827.

LIST OF EXPIRED PATENTS,

Continued from p. 16.

MARINER'S COMPASS.—George Alexander Leith, for his improved mode of suspending the cord of the mariner's compass.

CANVASS.—William Broughton, London, for a new and better sort of canvass.

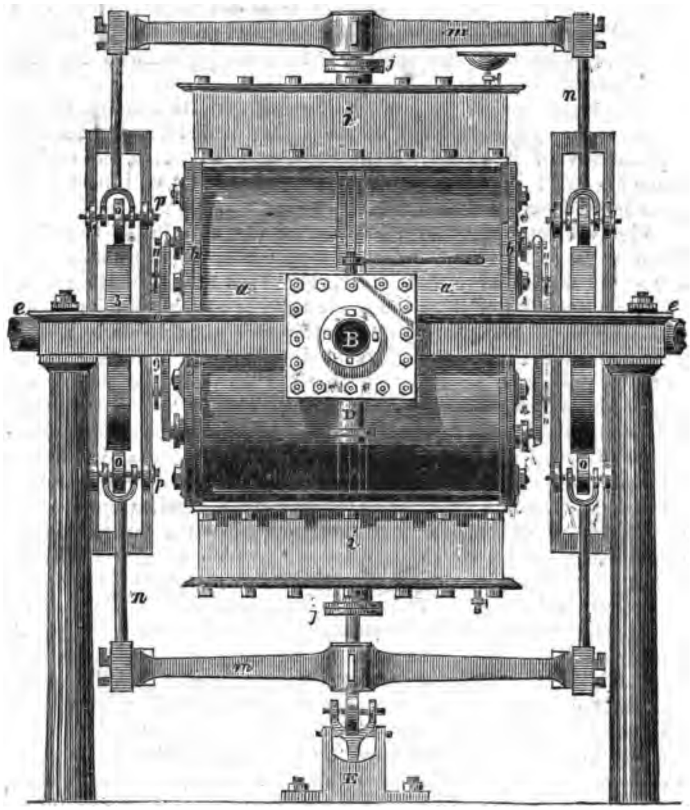
LOOMS.—Peter Ewart, Manchester, for a method of working weaving looms by machinery.

BUILDING MATERIALS.—Joseph Hamilton, Dublin, for a new method of constructing and connecting earthen building materials.

FILES.—Charles Pinley, Birmingham, for an improved method of making files and various other articles.

MALT AND HOPS.—John Roberts, Macclesfield, for a method of contracting or reducing into small compass, such part of malt and hops, as are requisite in making ale, beer, and porter.

CHAINS.—Joseph Smith, Corely, Stafford, for an improved construction and manufacture of chains.



PATENT ROTARY STEAM ENGINE,

By ELIJAH GALLOWAY, ESQ. Civil Engineer, of Newcastle.—*Enrolled 29th June*, 1827.

IN a country like this where steam power is employed in the manufacture of almost every article of commerce, and of domestic utility or convenience, any improvements effected in the construction of the machine by which the power of steam is applied, or any economy introduced in its application is of great importance even in a national point of view; and hence have arisen the numerous modifications of the steam engine. A great variety of attempts have been made to introduce an engine where the power of the steam could be applied in giving circular motion to machinery at once, without first producing an alternating motion: but most of the rotary engines hitherto tried have been found either too complicated in structure, or too defective in practice, for general adoption. Mr. E. Galloway

having devoted much of his attention to remedy the defects common to all rotary engines, (as is evident from his able History of the Steam Engine, just published,) has invented an engine of this kind, a description of which we shall now have the pleasure to lay before our readers.

This invention displays much ingenuity in its construction and judgment in the adaptation of its parts; and from the successful applications of it already introduced, and wherever the saving of space occupied by the machinery is an object, it will be found of great importance, and particularly in steam navigation.

Figure 1 represents an elevation of the exterior of this Rotary Engine. Fig. 2 represents an end view: Fig. 3 represents a section of Fig. 2: Fig. 4 of Fig. 1. *a a,* Fig. 1, 3 and 4, is the cylinder, being accurately bored in the same manner as the cylinder of other steam engines, excepting that at the two ends there is a rabbet. The flanges are also turned rectangularly to the cylindric part, so as to be quite smooth and true on their faces. The lids or caps, *b b,* (1, 2, 3), are turned on their flanges also, they are then turned flat from *c* to *f*. At *f* they project inwards, and form the cylindric bosses *d d,* (also turned), until they nearly meet each other in the interior of the cylinder, leaving only a space of about two inches in large engines, and a proportionably less one in smaller engines. The turned flanges of the lids being ground against the turned flanges of the cylinder form a steam tight joining, which is made additionally secure by the corner or angle of the lid being at the same time ground against the rabbet in the cylinder. On opposite sides of the cylinder Fig. 3, there are two apertures cut quite through of an equal breadth, and extending the lengthway of the cylinder parallel to the axis, and of such a length as to reach about three quarters of an inch over the flat parts *c f,* of the lids. Grooves of a corresponding breadth, and 3-4ths of an inch deep, are cut in the lids from *c* to *f,* in a direct line to the axis. Similar grooves, *f f,* are cut in the bosses parallel to the axis. These are about an inch deep, and of the same breadth as the former. The dimensions of these grooves will be varied, to suit the size of the engine. It is apparent that a section from *y* to *z,* Fig. 2, will pass through the centre of all these grooves. The sliders, *g g,* Figs. 3 and 4, are two plates of metal faced with a thin facing of brass or gun metal; they are of such a thickness as to move freely in their respective grooves, of such a length as to extend from the bottom of the grooves in each lid, and of such a breadth as to reach from the outside of the cylinder to nearly the bottom of the groove *f f.* The purpose of these grooves is to form a bearance for the sliders, which being made smooth and flat, and afterwards ground into their places in the grooves, become steam tight in every part, excepting at the space left between the bosses. Now there is a central plate *x,* (Fig. 3 and 4), which is attached to and revolves with the axis *e e.* This plate is of a thickness sufficient to occupy the space between the bosses, and is kept steam tight by the circular rings 1 1 and 2 2, (placed in recesses turned in the bosses) pressing upon each side of the plate *x.* Under-

neath each plate is introduced a quantity of hempen or cotton packing, which answers the double purpose of preventing the escape of the steam between the ring and its recess, and that the elasticity of the packing, by keeping the ring pressed upon the plate, prevents an escape in that direction. To make the sliders and the central plate form a steam-tight union, small pieces of brass are screwed to the sliders, and thereby allow them to be brought into contact with the edge of the plate, *x*, without permitting any part of the sliders to touch the bottom of the grooves, *f f*. At opposite points of the plate *x*, there is a small portion of the circle cut away, (see F,

Fig. 2

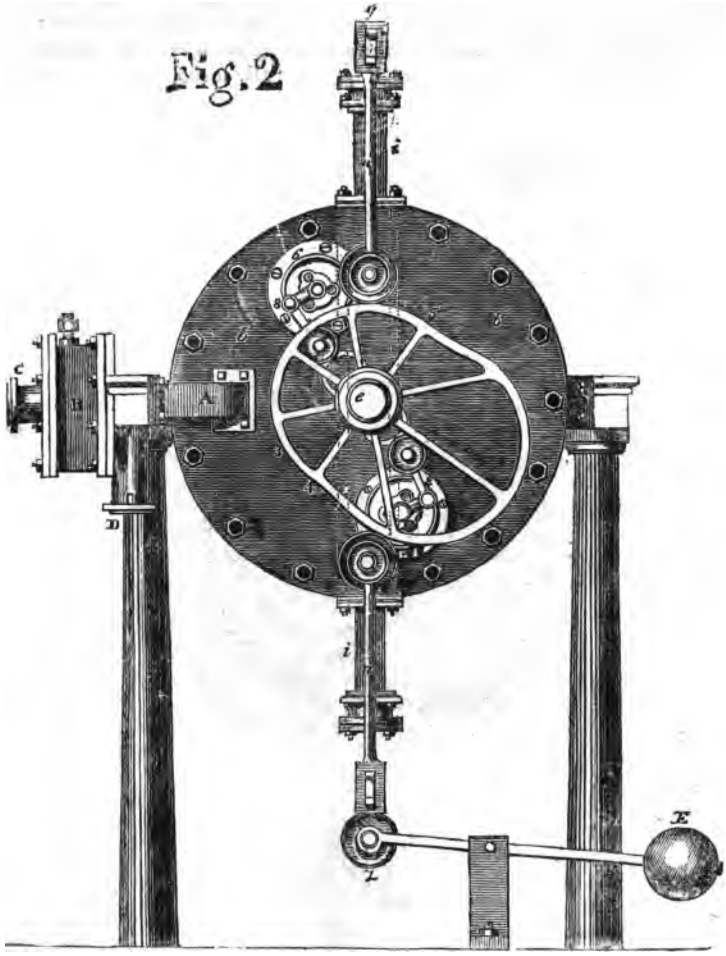
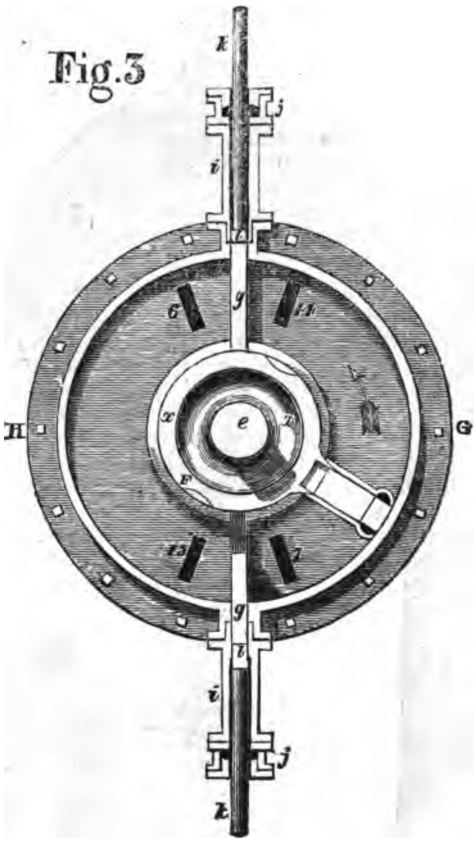


Fig. 3). The purpose of which is, that the sliders may be moved into their places without noise, for that is produced by the striking of two substances together, and these sliders cannot strike against the bottom of the grooves, nor yet, from the external cam, against the periphery of the plate.

The boxes or cases, *i i*, 1, 2, 3 and 4, are for the reception of the sliders when they are withdrawn from the cylinder. Stuffing boxes, *j j*, are placed in the middle of the bonnets, through which the rods, *k k*, are worked. These rods are attached to the sliders by means of cross pieces, *b b*, Fig. 3, which are dovetailed and bolted to them: and at the outer end they are keyed to the cross heads, *m m*, 1 and 2, similarly secured to the rods, *n n n n*, which are forked at the ends nearest to the axis. A small spindle passes through the ends of each fork upon which run three friction sheaves, the larger ones, *o*, Fig. 1, being placed between the forks, and the smaller

Fig. 3



ones, *p p*, on the ends of the spindle. They are not fixed to the spindle, and therefore may revolve separately and independently of each other.

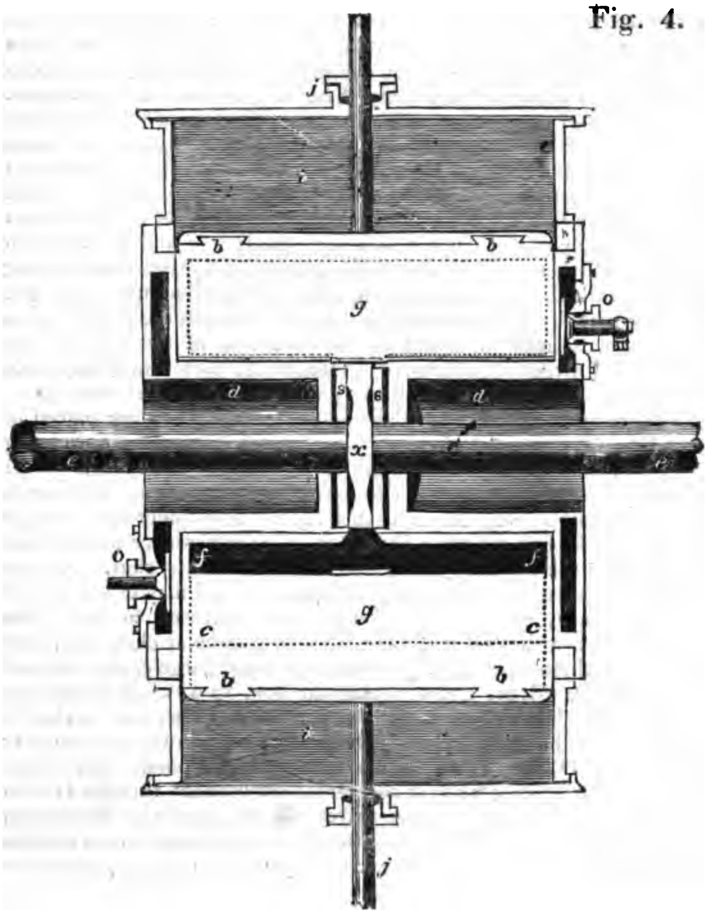
The piston consists of four pieces of brass or gun metal, of about 2¼ inches in thickness, filed or otherwise made perfectly smooth, and uniformly thick. Each piece is in the form of the letter L, in the interior of the piston; and spiral springs, acting against an abutment, force them outwards. Two plates of metal, having a facing of equal breadth to the brass, are laid on each surface of the brass pieces, and pressed on them by means of the brass bolts passing through the whole of the piston. These plates and the brass pieces being previously ground together, prevent the steam from escaping between them; and, as an additional security, there are semi-circular grooves cast in the metal plates, into which hemp or cotton is stuffed, and by pressing on the brass prevents the possibility of an escape, except at the points of union between the brass pieces. In order to make these parts tight also, small overlap pieces are sunk into the brass about one-fourth of an inch, and as the piston wears away and widens the openings between the pieces, these still continue to cover them. Those parts of the brass which are against the arm of the piston are let into recesses, and hemp or cotton is placed underneath them which prevents escape in that direction. This is called a compound compensating piston: it possesses the property of being more tight than metallic pistons are generally, (by the using of both hempen and metallic packing,) and also being equally free and not liable to be jammed when heated; this latter qualification arises from making the bolts, which hold the plates together, of the same material as the wearing part, by which means the distance between the plates, when heated, is as much increased by the expansion of the bolts as the intervening pieces are expanded, consequently they cannot be bound or jammed in their places under any variation of temperature.

There are four valves in this engine; two of them are placed in each lid. They consist of circular brass plates, the bottom ones being cemented or otherwise fastened into a recess in the end cast for them; the upper plate then is placed above, and both being previously ground together, the steam cannot enter the cylinder but through them; that is to say, when the holes in each plate are placed over each other, the valve is open, and when otherwise shut. A plate covers the recesses in which the valves work, and may either be cast with the ends, or afterwards bolted and cemented to them; the spaces between the lids and the plates form circular chambers; and have each three openings; two circular ones, large enough to get readily to the valves, and a rectangular one, to which a steam pipe is attached. Bonnets cover the circular holes, which are thicker in their centres, having a cylindric hole large enough to admit smaller bonnets, O O, Fig. 4, to be placed therein. Spindles previously keyed to the moving plate of the valves are brought through O O to the exterior of the lids. These valves and the spindle are kept steam tight by the screws of O O being turned a little round, which presses the bonnets, O O, in the first instance upon the enlarged part of the

spindle, (shown at Fig. 4,) and also upon the face of the fixed valve plate. Small cranks, 8 8, Fig. 2, are attached to the outer ends of the valve spindles, which are connected to the gear, 9 9. Upon this gear are fixed two friction sheaves, which being acted upon by the cam, 01, at proper periods, the cranks, and consequently the valves, are alternately moved to and fro by the revolution of the axis, *e e*: one of them opening when the other is closing, and *vice versa*.

3 3, Figs. 1 and 2, are two cams, one half of which (namely, from 4 to 5) are concentric with the axis, and the other part is the eccentric or cam part, by which the sliders are moved. The motion is produced by the eccentric part acting on the sheaves, *o o*, Fig. 2, and moving them to and from the axis. The smaller sheaves, *p p*, run between guides, (see the dotted lines, Fig. 2,) which preserve a vertical motion to the rods *n n*.

Fig. 4.



The holes through which the steam escapes and is admitted are placed as near the slider as they can be brought, and are shown for the purpose of illustration, as being all in one lid, at Fig. 3, though as has been previously stated, there are two in each lid. The effect however, would be the same were they as represented in Fig. 3, and therefore this mode of explanation will be as clearly understood.

A pipe is brought round, as at A, Fig. 2, into a steam chest, B, Figs. 1 and 2, in which latter is a common slide valve. Into this steam chest the steam is brought from the boiler by the pipe C, and escapes into the atmosphere or condenser by the pipe D. This slide valve, and the apparatus connected with it, are for the purpose of reversing the motion of the engine.

In order to put this engine in operation, steam is admitted into the steam chest B, when the slide valve is placed in such a position as to allow the steam to enter into one end, and escape at the other, or in other words, when the valves 6 and 7, Fig. 4, are the induction valves, and 14 and 15 the eduction valves; and when the piston and sliders are in the position shown at Fig. 4. The valve, 14, is then open, and communicates with atmosphere or condenser, and the valve, 7, with the boiler; the steam, therefore, entering through 7, rushes against the piston and the upper slider which becomes the abutment against which the steam exerts its force. The piston recedes from the pressure in the direction of the arrow, turning with it the central plate, *x*, the axis, *e e*, the cams, 3, 3, and the valve cams, 01, 01. As the shaft turns therefore, the cam 3, Fig. 2, revolves, and the cam or eccentric part gradually leaves the lower rods, *n n*, and presents the *concentric* part to the sheaves of the said rods. Now the lower cross head being pressed upwards by the counterbalance, E, gradually ascends into the cylinder, so that when the point 4, is in contact with the sheaves of the lower rods *n n*, the slider has then reached its place in the cylinder, being nearly in contact with the central plate F, and also upon its bearance in the grooves before mentioned; the piston will be then at the point G of the cylinder, and both the sliders shut the two valves, 7 and 14 only being open. Now as the piston continues to revolve, the cams 3 3 are gradually opening the upper slider and the cams 10, gradually shutting the valve 14 and opening the valve 15, so that when the piston reaches the valve 15, the former is completely shut, and the latter completely open, and when the piston reaches the upper slider, it is completely withdrawn from the cylinder, and thereby allows the piston to pass it. At this point, the steam is entering through 6, and escaping through 15, the lower slider being then the abutment upon which the steam acts. After the piston has passed the upper slider, the cam 3 allows the piston gradually to return to its place in the cylinder, and after the piston has passed the valve 6, that valve begins gradually to open, and the valve 7 to close. Therefore, when the piston has reached the pipe H, the upper slider is in its seat in the cylinder, the valves 7 and 14 are quite shut, and 6 and 15 quite open: the cam 4 then begins to give motion to the lower slider, as before described, and

the cams 10 to the valves, so that a constant rotation of the axis is kept up.

To reverse the motion of this engine, the sliding valve in the steam chest is moved on its face, so that the valves 6 and 7 become the eduction valves, and 14 and 15 the induction valves. Supposing the piston therefore in the position shewn in Fig. 3, and the steam previously entering through 6 and 7, and escaping through 14, it will be seen that if 6 and 7 become the escape valves, and 14 and 85 the induction valves, the steam from the boiler will then rush through 14 and press upon the piston, and so drive it in a direction contrary to the *arrow*, whilst the steam, before actuating the engine, escapes through 6 and 7, which being shut and opened at their proper time by the cams 10, keep up the rotation in the opposite direction.

The difficulties which have been encountered in the construction of a rotary engine, have been so repeatedly enumerated in the course of this work, that it would be needless to give them here. It will be remembered that great friction, leakage, and the difficulty of maintaining the packing steam tight, have been generally found the great obstacle to the successful adoption of such engines. It is calculated that these objections have been removed, by the author's patent engine. The friction has been reduced in a very great degree, compared to that of the reciprocating engine, the greatest being caused by the revolution of the piston and shaft. The sliders are found to cause scarcely any friction, as they are only moved, when they are surrounded on every side by the same medium; and as the grooves are sufficiently wide, to allow them to move without rubbing against their sides, the only resistance is caused by the rods working through the stuffing boxes. The valves also have the advantage of being only in motion, when they are surrounded by the same medium, and consequently the wear and friction is reduced, considerably below that of the slide of a common engine, which is only moved when under a pressure of steam.

The leakage is found to be considerably less than the leakage of all the engines on this principle which we have hitherto seen. This superiority arises from the use of the compound packing in the piston, by which a great defect in metallic pistons has been obviated. This defect was the difficulty of making the metallic pieces which formed the packing, of an equal thickness, and of bringing them in sufficiently close contact with the plates which enclose them: for it will be seen, that unless the whole of the metallic packing were of an uniform thickness, it would not, when moved out of the situation into which it was at first fitted, fit so closely to the covering plate, and consequently a leakage would take place. By the improved method, however, it is not necessary that the packing should be so carefully constructed, because the elasticity of the hempen packing, would make up for any little irregularity in the metallic part.

The sliders are found also to be much less liable to leakage than the abutment of other rotary engines. This advantage may be attri-

buted to the bearing in the grooves being inaccessible to the piston, or any other part of the machine, except the sliders themselves, and consequently the flat surface originally given to them, is not liable to be destroyed by wear, which is the case with those engines which have leaves or flaps, or even where there are sliders which do not rest entirely in grooves as in the present instance. It is found also that these sliders do not wear out of form, or become leaky, because owing to their vertical motion and the width of the grooves, they can hardly be said to touch the sides of the grooves until they are forced against them by the steam, which only happens when they are at rest.

Not the least evil which the makers of rotary engines have had to contend with, has been the rapid destruction of those parts which have struck each other. Now this is a fault that has invariably existed in all the engines with leaves or sliders. It is however here completely obviated by the mode of bringing the sliders to rest, for instead of allowing them to strike the central plate, a cavity is formed therein at the part where the slider would (but for that cavity) have come in contact with it. The slider therefore can neither touch the bottom of the grooves in the bosses, nor yet the central plate; the external cam work preventing from reaching so far into the cylinder. The edge of the plate and the slider are brought into contact by the circular part of the former, gradually introducing itself like a wedge under the slider after it is at rest, and consequently a stroke is avoided.

In confirmation of the superiority of this engine, we can state, that a small engine of about one horse power, has been in operation for many months, and, is found to possess all those advantages above stated. An engine of fifteen horses power has also been tried at the Iron works of Messrs. Hawks and Co. of Gateshead, in the county of Durham, which drove with ease a tilt hammer, to which a larger engine had been previously applied. The engine was attached by temporary and very defective frame work to the hammer, and in consequence of an accidentally increased resistance of the hammer, the connecting shaft was broken, or rather twisted in two by the power of the engine, although the shaft was calculated as able to sustain a force full one half more than the assumed power of the engine.

We have just received intelligence that another engine of this construction, of 10-horse power, has recently been completed at Newcastle, and has been put on board a steam boat, which, on the first trial, surpassed all the other steam boats on the river Tyne, even with engines of nominally double the power.

PATENT CARRIAGE STEP.

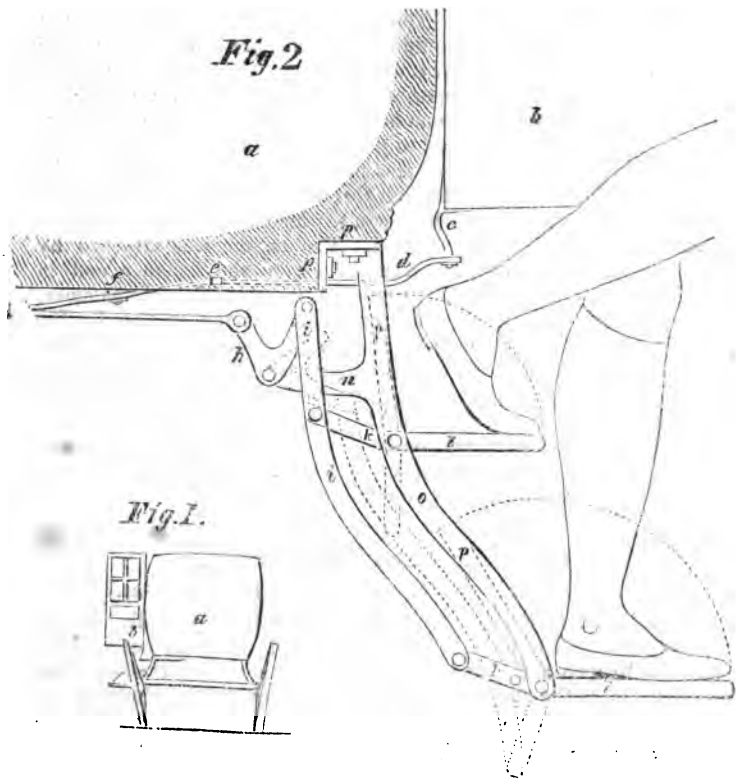
By Ross Corbet, of Glasgow.—*Enrolled December*, 1825.

This improvement is applicable to coaches generally, but is peculiarly adapted to such, the proprietors of which do not employ a footman to open and shut the door and steps; as the act of opening the door causes the steps to be opened out, and that of shutting the door shuts the steps up again. For this reason, it is presumed, that the invention will be found a great convenience to medical men and stage

coach proprietors. We have seen a chariot fitted up with a pair of these patent steps, at the manufactory of Messrs. Holland, in the Coal Yard, Drury Lane: the steps are strong without being clumsy, and their operation is so smooth and easy, as to require, *apparently*, no more force to open and shut the door, than is applied to open and shut a carriage door without this appendage.

In the annexed engraving Fig. 1 is intended to represent the back view of a coach, on one side of which the steps and door are both open, and on the other they are both shut. Fig. 2 gives a side view of the steps only, on a larger scale, and will, we trust, enable the reader to understand their construction.

At *a* is the coach body; *b* a part of the coach door open; *c* is a bent iron fixed to the bottom of the door, connected to a curved rod, *d*, at the extremity of which is a joint, *e*, attaching it to the lever, *f*, which moves upon a fulcrum in the middle. At *g* is another joint, by which and an intermediate rod it is attached to one of the horns of the crank, *h*: the other horn of this crank is connected by a joint to the long curved lever, *i i*, which gives motion to the short levers, *k k*, and these last being in one piece with the steps, *l l*, they move



together. The long curved bar, *o*, (of which there are two, one on each side of the steps,) and its short branch, *n*, are fixtures, being bolted to the body of the carriage at *p p*.

The reader having noticed the train and connection of levers just mentioned, will readily perceive that the act of shutting the door of the carriage will cause the lever, *f*, to assume another angle, by which the crank, *h*, and consequently the bar, *i i*, will be thrown into the position shown by dotted lines; and that it necessarily follows the steps will be forced into the situation shown by dotted lines, at *l' l'*.

PATENT VARIEGATED WEAVING,

By Messrs. Gibbs and Dixon, of Laurence Lane, London.—*Enrolled July*, 1826.

The object of the patentees is the fabrication of cloths *(piece goods)* having a speckled appearance, and of variegated hues; this is effected by composing the weft or shoot of two different coloured threads twisted together, which may be of silk, of silk and worsted, or of linen, cotton, silk, and worsted, variously combined. The more the colours are contrasted the more brilliant, of course, is the effect: long specks or spots are produced by twisting the threads very slightly, and short or minute ones by a hard twist. The warp of the fabric, as well as the shoot, may be composed of a similar or different arrangement of threads, and thus by slight variations a great diversity of pretty patterns be obtained.

THE WATER WORKS AT PHILADELPHIA,

Constructed under the Direction of F. Graff, Esq.

The following description, and the annexed engraving, of the water-wheel and force-pump, constructed at Fair Mount, for supplying the city of Philadelphia with water, is extracted from a recent number of the Franklin Journal, in which the able editor (Dr. Jones) announces his intention of giving, in a subsequent number, a more detailed description of the works, for those readers of his Journal who are not conversant with the general structure of hydraulic machinery.

These works, Dr. Jones observes, have been admired by all who have seen them, as monuments both of the taste and skill, of the persons concerned in the plan and erection of the buildings, and in the construction and execution of the machinery.

The water is forced to a perpendicular height of 96 feet, through mains of nearly 300 feet in length. The quantity raised by one pump, in 24 hours, is upwards of 1¼ million of gallons (ale measure). The reservoirs are elevated 56 feet above the highest ground in the city.

The pump is what is called the double forcing pump; producing an equal effect in raising water in whichever direction the piston moves. The working barrel is 16 inches diameter in the clear, and the half stroke of the pump is 5 feet, giving 10 feet stroke for each revolution of the water wheel, of which there are 13 in a minute.

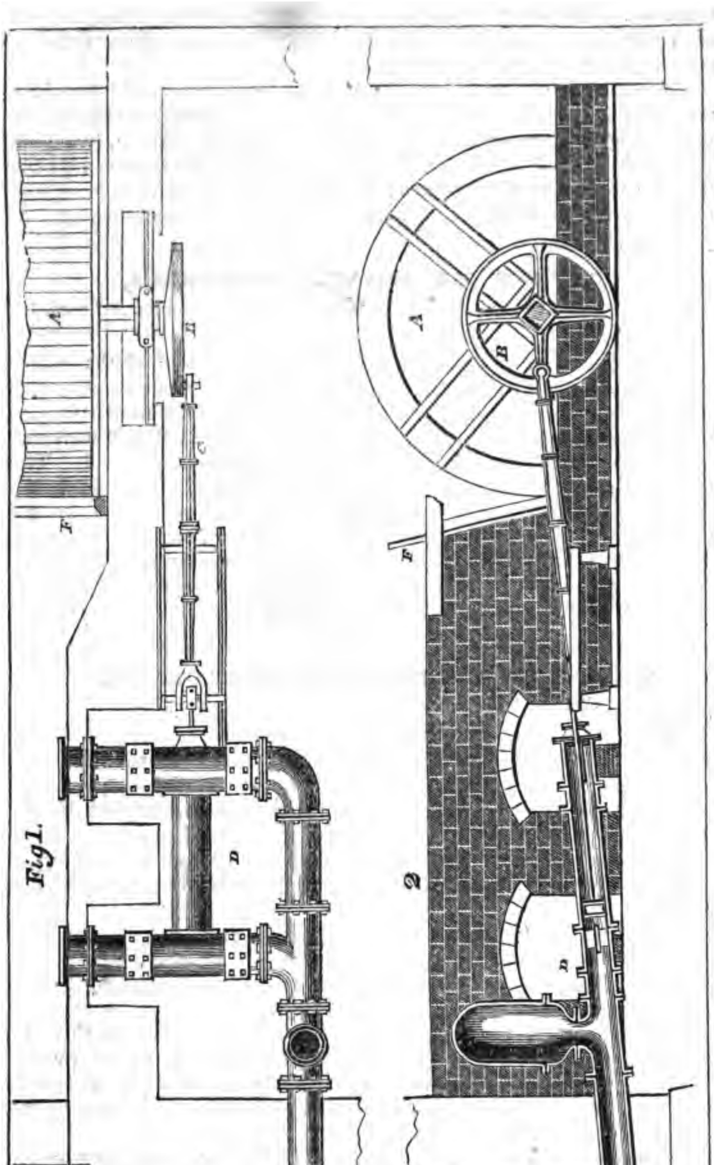


Fig1.
2

Fig. 1 represents a plan, and Fig. 2 a section of one of the water wheels and forcing pumps. In the plan but a small portion of the water wheel is shown, broken off for want of room in the page.

A is the water wheel; B the crank wheel; C, connecting rod from the wheel to the pump; D, plan of the pump; E, the forebay, which supplies the wheel and pump with water; F F, the gates to the forebay and water wheel; G, the water line.

SCIENTIFIC INSTITUTIONS.

London University.—List of Professors elected,—continued from page 30.

Anatomy and Physiology. Charles Bell, Esq. F.R.S. F.L.S. Professor to the Royal College of Surgeons.

Engineering, and the application of Mechanical Philosophy to the Arts. John Millington, Esq. F.L.S. Civil Engineer, and Professor of Mechanics at the Royal Institution.

Nature and Treatment of Diseases. J. Conolly, M.D.

Midwifery and the Diseases of Women and Children. David D. Davis, M.D. M.R. S.L.

Materia Medica and Pharmacy. Anthony Todd Thompson, M.D. F.L.S.

London Mechanics' Institution.—July 20, Mr. Toplis (instead of Mr. Smith, whose lecture on *Mnemonics* had been announced, but whose absence from town prevented his attendance) delivered a very interesting lecture on the *Strength of Materials*, in which he explained to the members Mr. Smart's improvements in the construction of Rafters, (as described in the Register of Arts, p. 28.) The lecture was illustrated with models of Mr. Smart's Rafters, as well as of his Patent Iron Bridge, (described in the 1st series of this Work, vol. ii. p. 49.)

At the conclusion of Mr. Brayley's second lecture on Wednesday last, it was announced to the members that his third lecture would be delivered on Friday, the 3rd of August, and the remainder of his course on the Fridays instead of the Wednesdays; that on Friday, July 27, Mr. Chapman will deliver a lecture on *Eloquence*; and on Wednesday, August 1st, Mr. Preston will commence a course of lectures on *Optics*.

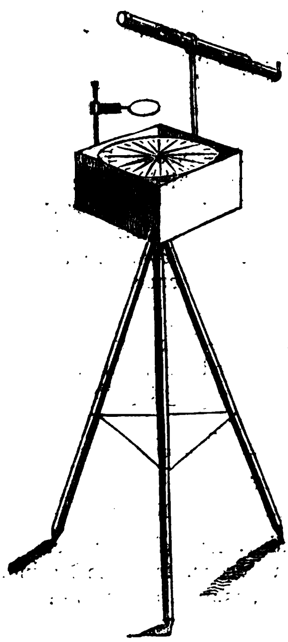
Rotherhithe Mechanics' Institution.—The anniversary of the Foundation of this Institution was celebrated on Wednesday, the 18th instant, by the Members and Patrons dining together at the St. Helena Tavern in that neighbourhood.

FOG AZIMUTH COMPASS.

By Lieutenant George Lindesay, R. N.

The many losses of valuable ships and lives which have occurred to all nations, and which are still liable to occur, from the mariner being unable to ascertain his ship's exact situation at sea, in foggy and hazy weather, *when no horizon can be seen*, is a truth too well

known to admit of dispute. Neither in the present system of navigation, nor among all the inventions and writings of the numerous authors on that subject, does there exist any effectual or unerring plan, for extricating a ship from this perilous predicament, which is so incident to the destruction of fleets, of commerce, and of the lives of passengers, and of brave seamen. As the visibility of the horizon at sea is the rule of calculation of the sun's altitude, so the danger of a ship being lost or misguided, in foggy and hazy weather of long continuance, when no horizon can be seen, may very easily be conceived and accounted for. To arrive at the important desideratum now alluded to, some experiments have been suggested and attempted, but they are all obviously inefficient. Any dependence on the operations of the spirit level, for instance, must evidently prove fallacious, inasmuch as that instrument on board of ship, is rendered, from its nature, incapable of exact steadiness, or of true mathematical position. Besides the working of bulky and ponderous machinery on board of ship, (putting their great expence out of the question,) must prove another insuperable objection to every nautical invention, otherwise sufficiently involved in tedious and complicated calculation. To obviate these difficulties and uncertainties, the present invention is offered to those interested in nautical affairs, as a useful addition to the science of navigation: the apparatus is very simple and convenient, as shown by the diagram in the margin.



It consists merely of a telescope *a*, attached to a common compass box, supported upon a tripod, and furnished with a magnifying glass *b*, for reading off the divisions. This fog compass may also be occasionally used to give the place of the ship in clear weather, should the vessel be without sextant or quadrant, or those instruments out of repair.

Application.—In using this compass, it is recommended to take two bearings of the sun, as near to the meridian as possible, and to note the elapsed time by a chronometer or good watch, and then to proceed in the usual way, to calculate from these data the sun's meridian altitude, which will give the latitude and the apparent time at ship, which being compared with Greenwich time, will give the longitude.

We admire Lieut. Lindesay's attempt, to remedy what is certainly a considerable inconvenience

at sea; but we much doubt whether observations can be made by the instrument in its present form, sufficiently accurate to be of general utility.

Horticulture.

ON HEATING GARDEN WALLS ARTIFICIALLY.—"The greatest disadvantage to which horticulture is subject in this climate is the uncertainty of clear weather; a circumstance which art has of course no means to control: no artificial warmth is capable of supplying the deficiency when it occurs; and without the solar beams fruits lose their flavour, and flowers the brightness of their tints. It has been attempted to procure warmth to walls by means of fires and flues; but without the assistance of glass, (to defend the trees from the atmosphere) we presume no great success has attended the trial."—*Daniell's Meteorological Essays.*

DISADVANTAGE OF BLACKENING GARDEN WALLS.—"It is well-known that solar heat is absorbed by different substances with various degrees of facility, dependant upon their colours, and that black is the most efficacious in this respect: it has, therefore, been proposed to paint garden walls of this colour; but no great benefit is likely to arise from this suggestion. It is probable that in the spring, when the trees are devoid of foliage, the wood may thus be forced to throw out its blossom somewhat earlier than it otherwise would; but this would rather be a disadvantage, as the flower would become exposed to the vicissitudes of an early spring. It is more desirable to check than to force this delicate and important process of vegetation, as much injury may arise from its premature developement."—*Ibid.*

ADVANTAGES OF PARALLEL WALLS.—"The most perfect combination for the growth of exotic fruits in the open air, would be a number of parallel walls within a short distance of each other, facing the south-east quarter of the heavens; the spaces between each should be gravelled, except a narrow border on each side, which should be kept free from weeds and other vegetables. On the southern sides of these walls peaches, nectarines, figs, &c. might be trained with advantage; and on their northern sides many hardier kinds of fruits would be very advantageously situated.—*Ibid.*

On the Trade Winds.

CAPTAIN BASIL HALL observes that the commonly-received notion of the origin of the trade winds, and the supposed uniformity with which the N. E. trade wind prevails in the northern hemisphere, and the S. E. in the southern hemisphere; and which current, becoming blended in the equatorial regions, then assumes the direction of east and west, is altogether erroneous; the real state of things, the Captain states, is as follows :—

"The trade winds in the Atlantic and Pacific extend to about 28 degrees, and sometimes a degree or two farther on each side of the equator; so that a ship, in passing the latitude of 30 degrees, may expect every day to enter them.

"The southern limit to the north-east trade wind varies with the season of the year; reaching at one time to within 3 or 4 degrees of north latitude, and at others not approaching it nearer than 10 or 12 degrees; but it *never crosses the equator*. It will aid the memory in this matter to bear in mind that the line which marks the termination of this trade wind follows the sun: in July and August it recedes from the equator, as it were, in pursuit of the sun; while in December and January, when the sun has a high south declination, it reaches almost to the line. I may remark, in passing, that it is upon a knowledge of these deviations from the general rule, which we are pleased to call *irregularities*, that much of the success of tropical navigation depends."

LIST OF NEW PATENTS,

Sealed 1827.

TELEGRAPHS.—To Rear Admiral Henry Raper, of Baker Street, Marylebone, London, for his improved system of signals;—first, for communicating by day by means of flags and pendants, between ships at sea, or other objects far distant from each other;—and secondly, for communicating by night between ships at sea, and other objects far distant from each other, by the means of lights. To be enrolled by the 21st August, 1827.

MOUNTING GUNS.—To Lieutenant James Marshall, of Chatham, Kent, for his improvements in mounting guns or cannon, for sea or other service. To be enrolled by 26th Dec. 1827.

CUTLERY.—To John Felton, of Hinckley, Leicestershire, for a machine for an expeditious mode of giving a fine edge to knives, razors, scissors, and other cutting instruments. Two months. To be enrolled by the 28th August, 1827.

WHEEL CARRIAGES.—To Thomas Fuller, of Bath, Somersetshire, for certain improvements on wheel carriages. Two months. To be enrolled by the 28th August, 1827.

STEAM ENGINES.—To Walter Hancock, of Stratford, Essex, for improvements upon steam engines. Six months. To be enrolled by the 4th Jan. 1828.

CHEMICAL APPARATUS.—To William Wilson, of Martin's Lane, Cannon Street, London, for a means of extracting spirits and other solvents used in dissolving "*gums*" of various kinds, and converting such spirit into use. To be enrolled by the 4th Sept. 1827.

LAMPS.—To Rene' Florentin Jenar, of Bunhill Row, London, for certain improvements in lamps. To be enrolled by the 4th Jan. 1828.

PENS.—To George Poulton, of Stafford Street, Old Bond Street, for an instrument for writing, which he denominates a self supplying pen. To be enrolled by the 4th Jan. 1828.

WINDLASSES.—To Thomas Sowerby, of Change Alley, London, for improvements in the construction of ships' windlasses. To be enrolled by the 4th Sept. 1828.

"METALLIC LINEN."—To Rene Florentin Jenar, of Bunhill Row, London, for his method of filling up with metal or other suitable material; the holes or interstices in wire gauze or other similar substances, which he denominates metallic linen. To be enrolled 4th Jan. 1828.

WATER CLOSETS.—To J. S. Skenton, of Husband Bosworth, Leicestershire, for certain improvements in the mechanism of water-closets. Two months. To be enrolled by the 12th Sept. 1827.

BUILDING PIERS, &c.—To E. B. Deeble, of St. James's Street, Middlesex, for a new construction and combination of metallic blocks, for the purposes of forming caissons, jetties, piers, quays, embankments, light houses, &c. To be enrolled by 12th Jan. 1828.

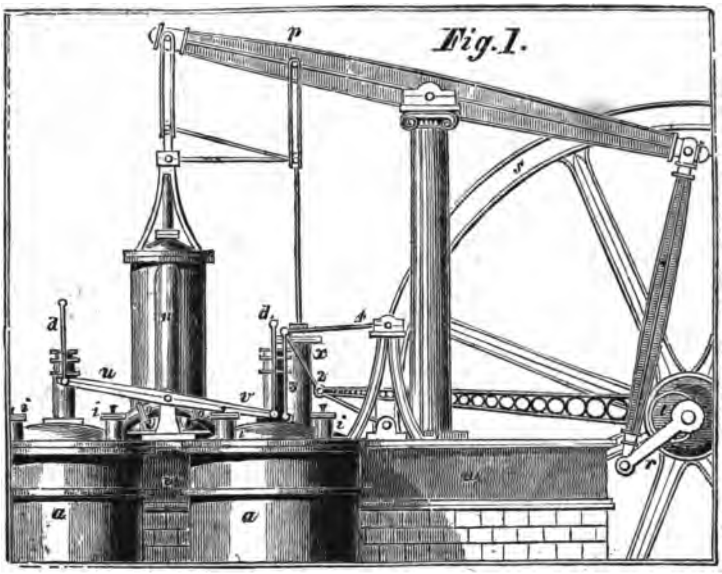
PREPARING FOOD.—To Robert Vazie, of York Square, St. Pancras, Middlesex, for his improvements in certain processes and apparatus applicable to the preparing, extracting, and preserving various articles of food, and other useful purposes.—To be enrolled by the 12th of January, 1828.

SPINNING.—To William Church, of Birmingham, Warwickshire, for certain improvements in apparatus for spinning fibrous substances.—To be enrolled by the 13th January, 1828.

TABLE URN.—To George Anthony Sharp, of Putney, Surrey, for an improved table urn.—To be enrolled by the 18th January, 1828.

DISTILLING.—To Robert More, of Underwood, Stirlingshire, Scotland, for improvements in the process of preparing and cooling worts or wash from vegetable substances, for the production of spirits: partly communicated to him by certain foreigners residing abroad.—To be enrolled by the 18th January, 1828.

DISTILLING.—To Robert More, of Underwood, Stirlingshire, Scotland, for certain processes for rendering distillery refuse productive of spirits: partly communicated to him by certain foreigners residing abroad.—To be enrolled by the 18th of January, 1828.



PATENT AIR ENGINE,

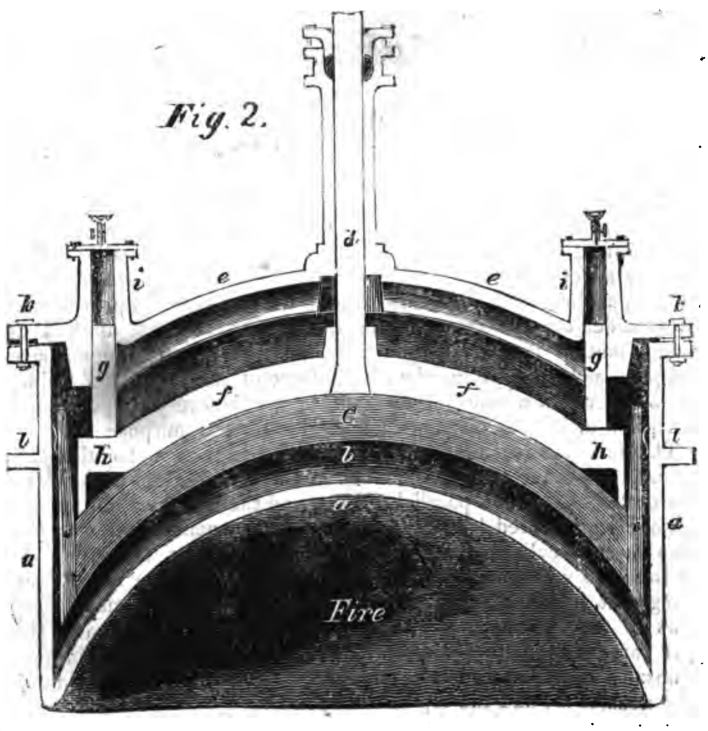
Invented by ROBERT and JAMES STIRLING, of Glasgow. *Enrolled July* 20, 1827.

ALTHOUGH it is well known that the elastic force of fluids generally, is increased by an increase of temperature, yet very few attempts have been made to render available this increased elastic force in any fluid except water, the vapour of which has long occupied the attention of the ablest engineers; hence the numerous improvements and modifications of steam engines, which have been applied to produce motion in machinery. Still, however, a few plans have been proposed for applying the elastic force of air and other fluids, and we have now the pleasure of laying before the public, a description of Messrs. Stirlings' air engine for this purpose.

This machine resembles the steam engine in the construction and application of many of its parts, such as the cylinder and piston, the reciprocating beam and parallel motion, and the fly wheel and crank, as above represented by Fig. 1. Motion is communicated to the piston in the cylinder, *o*, by alternately heating a portion of air connected with one side of the piston, and at the same time cooling that in connection with the other. And this is effected by means of the air vessels *a, a,* one of which communicates with the upper part, and the other with the lower part of the cylinder; through the nozzles *m m*, the pipe *n* forming the communication between one of the nozzles *m*, and the top of the cylinder.

Fig. 2. represents a section of one of the air vessels, whose sides are cylindrical, and top and bottom spherical. This air vessel, which is made of cast iron, and supported in the brick work by the projecting ledge *l l*, is furnished with a plunger, *c C c*. The top and bottom of the plunger is made of strong sheet iron, perforated with very numerous small holes to admit the air. The interior of the plunger is filled with very thin plates of sheet iron, so bent as to prevent their flat surfaces from coming in contact, that the air may have a free passage between them. These are also perforated with small holes, which holes are not placed opposite to each other, but so arranged, as to cause the air to pass through the plunger in a zigzag direction. The patentees state, that the interior of the plunger may be filled up with pieces of brick, gravel, or other granulated substance, instead of the thin sheet iron. The plunger is formed circular, to fit the top and bottom of the air vessel, when drawn up and down. The rim *c c* of the plunger, which moves in a cylindrical receptacle at the circumference of the air vessel, as represented, is not perforated as the other part. It is kept steady by the spring *u u*, consisting of a belt of thin sheet iron, attached at its upper edge to the rim *c c*; a number of slits are made from the lower edge of the belt, to admit of its being bent outwards, to rest against the

Fig. 2.



air vessel and act as a spring. The plunger is also kept steady in its ascent and descent, by the plunger rod *d* passing through the stuffing box at the top of its case, and the guide rods *g g*, which work in the guide cases *i i*, figs. 1 and 2. The guides are fixed to a ring *h h*, which is attached to the plunger and the plunger rod by the arms *f f*, four in number; they are supplied with oil by an oil cup and stop-cock at the top of their cases. The top *e e* of the air vessel is flanged down in the manner represented at *k*, with a thin ring of sheet lead between the flanges, to keep the joining air tight.

The lower part of the air vessel is heated by a fire-place under it, and its upper part kept cool by a current of cold air, by water, or by other means.

The plunger rods of the air vessels *a a*, fig. 1, are attached by slings to the ends of the beam *v*, so that the motion which elevates one plunger in one of the vessels, depresses that in the other.

When the plunger is raised, the cold air in the upper part of the air vessel, will be heated in passing through the interstices of the plunger in its ascent, which has itself been heated on reaching the lower or hot part of the vessel, and during this time the air in the other vessel will be cooled, by passing through the interstices of the plunger in its descent, which has itself been cooled by reaching the upper or cold part of the vessel. These changes of temperature are further augmented, by portions of the air being alternately changed from the hot to the cold, and from the cold to the hot parts of the vessels, by the alternate occupation of the hot and cold parts by the plunger.

Now, as one of the air vessels is connected with the top, and the other with the bottom of the working cylinder *o*, there will be a motion produced on the piston, by the alternate application of the expansive force of heated air, and this motion is communicated to the beam *v*, through the piston rod and parallel motion *q*, and to the connecting rod at the other end of the beam, and the crank *r* to the fly wheel *s s*. On the axis of the fly wheel is fixed an eccentric *t*, which communicates motion to the plungers in the air vessels, through the system of levers 1, 2, 3, 4, and the beam *v*: and this motion is adjusted, so that the change of the plungers shall be effected whenever the piston reaches the top or bottom of the cylinder; thus applying to that end of the cylinder where the piston is, the hot air, which, by its increased elasticity, will drive the piston to the other end.

The diameter of the nozzle *m* is ¼ the diameter of the cylinder *o*, and 1-fifteenth of the diameter of the air vessel *a*.

This engine is also furnished with an air pump, the piston rod of which is shewn at *x*, for condensing air into the air reservoir *w w*. The air is permitted to pass through self acting valves into the nozzles *m m*, and thence into the cylinder *o*, or the air vessels *a a*, but not permitted to return from these vessels or the cylinder into the reservoir, which is also provided with a safety valve for the escape of superfluous air, when more is pumped in than is necessary to supply the air vessels. The diameter and length of the stroke of

the air pump are half those of the cylinder, but this appendage is not required to be kept constantly at work.

The patentees state, that any of the permanent gases may be employed, instead of atmospheric air. They do not claim as their invention, the application of these bodies to produce motion; but merely the above arrangement of machinery, for applying the elastic force of gaseous bodies to the production of motion.

EXPERIMENTS IN GAUGING,

Made at the Distillery of Messrs. Booth & Co., in Cow-Cross Street: exhibiting a curious hydrostatic phenomenon.*

Having been called upon by *Mr. Grimble,* rectifier, of this house, to gauge a new store vat, it was decided that it should be done upon my own system, as affording greater accuracy than the inch method, in common use.

It being winter, and during the severe frost, a quantity of ice had to be removed, to admit of the lower dimensions being accurately taken, a small portion of liquor after cleaning, having remained in the vat.

The dimensions were then taken with all possible precision, by a new imperial rectilinear gallon unit rod; and, unless the frost might have contracted the lower dimension in a very minute degree, nothing could have presented a better opportunity for a correct gauge, the cross diameters agreeing almost exactly, and the figure being the frustrum of a cone.

Having finished taking the dimensions, *Mr. Grimble* stated his intention of fixing a glass tube on the outside of the vat, for reading off the quantities within, as a means of comparing with the interior dip. The idea I knew had been some time since entertained by others, who have made some attempts in the same way, but without success.

This tube was ordered of above an inch diameter; by which it was expected no difference would arise from capillary attraction; and was fixed up, perpendicularly, with an imperial rod placed closely, so that *zero* of the rod, coincided with the top of the *ungula,* which exactly covered the bottom, without producing any sensible depth of wet at the dipping place; from which it was inferred, that the interior *dip,* and the exterior indication of *level,* would be always the same; and upon several examinations, putting *in* determined quantities, those quantities were indicated by the tube exactly; but a difference was afterwards perceived, between the interior *dip* and the exterior *level,* and the greater the quantity the greater the difference. The tube was fixed at about twelve

* Communicated by Mr. W. Gutteridge, author of a New System of Stereometry; and inventor of rods for facilitating calculations in gauging, which he denominates the *rectilinear and the curvilinear imperial gallon unit rods;* an account of which we shall give in a future number.

inches from the angle of support, and the dipping place was about sixty inches nearer to the centre, where there was no support; it was, therefore, inferred that the difference arose from the timbers giving way; and upon examination, this was found to be the case; but to what extent could not be easily ascertained; and it was, therefore, resolved that when the vat should be empty, to place an iron support under the centre.

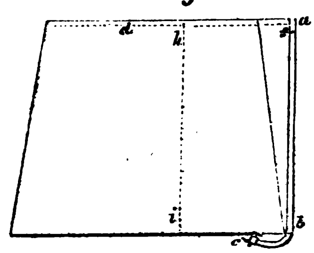
On emptying, very little difference was discovered to have taken place, and the iron support being fixed, a perfect adjustment was made. Various quantities were again measured in, which, as before, were accurately indicated by the tube; but some time afterwards a variation took place; as the quantity increased, so did the difference between the interior dip, and the exterior level. It was now thought, that this difference might possibly arise from the compression of the timbers, which were of deal, and upon examination, something of that nature was indicated; but nothing sufficient to account for the difference. Conceiving that the level of the spirit in the tube, might be affected by temperature, experiments were made, when it was found, that the spirit in the vat was 2½ degrees higher than that in the tube, which was also separated, by means of a cock, from that within; nor was it probable that the mere turning the cock, could communicate the temperature of either to the other; whence a difference would arise upon this spirit, (which was 41.6 per cent. over proof,) of about .013 of an imperial gallon rectilinear unit, or about .085 of a common inch; but we chose a time for our principal experiment, when the temperatures were alike, to save computation of this sort. With 1400 gallons *in* the vat, the difference was .09 of an imperial unit, or about .6 of an inch. 2200 gallons more were now pumped in, when the difference encreased to .15 parts of an imperial unit, or about .98 parts of a common inch; and on adding 700 gallons more, the interior dip was 14.06, and the tube 13.89 rectilinear gallons respectively; making a difference of about one inch and a tenth. It appearing highly improbable, that the timbers could compress so much more under the dipping place, than under that where the tube was fixed, we determined to take a level of the two surfaces; and, extraordinary as the fact will appear, there was a difference in those levels of .06 of an imperial unit, or about .4 of an inch, higher in the vat than in the tube! thus seeming to give a negation to the *axiom* that "all fluids at liberty, find their own level." I now had decided, the additional compression of the timber under the middle, to be equal to the difference between the interior and exterior indications, *minus* the difference of their levels, and had only to account for this very singular circumstance, which, I entertained an opinion, could only arise from the spirit in the tube, having acquired a greater specific gravity, than that in the vessel. The tube had not a cock to draw off its contents, and therefore was carefully detached from the vessel, and the spirit assayed, when between 4 and 5 per *cent*. difference was found between a sample of this spirit, and that within: the latter being the strongest by so much.

The only thing further which it would have been desirable to have ascertained, was, the cause of this difference, which undoubtedly partakes of an increased evaporation from the tube, and an increase in the specific gravity of the spirit, in the bottom of the vat; this, however, for want of a cock to the tube, could not be ascertained; but enough has been done, to shew that an evaporation is most rapid from such a potent spirit, and cannot be too carefully guarded against; for if the difference arose only from evaporation, from a tube of only an inch in diameter, and 90 inches long, from the mere exposure of a surface so small, and where even the top of the tube was closely stopped with a brass cap, the immense loss that must be sustained, where a large surface is exposed to the action of the atmosphere, may be easily calculated.

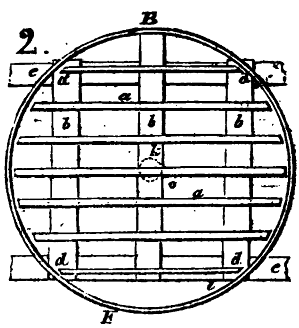
Wm. Gutteridge,
No. 1, Castle-Court, Budge-Row.

The following diagrams of the vat, tube, and timbers, will render the subject more intelligible.

Fig.1.



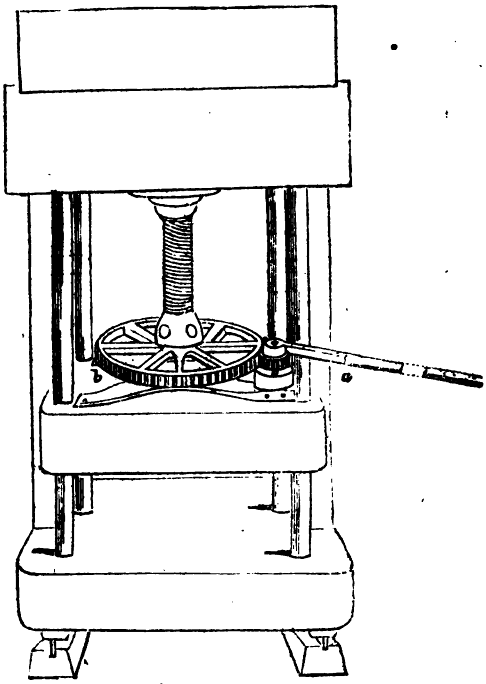
2.



The *figures* will assist to elucidate the positions of the vat and tube.

Fig. 1, indicates a section of the vat, *a b* being the tube, fixed into a metal pipe *b c*, with a cock at *c*. *d*, the level of the spirit in the vat; *f*, the level in the tube; and *k i* the dipping place.

Fig. 2, indicates the support of the vat; B the back, and F the front, of which the seven similar parts *a a* are the immediate rests, each 4 inches square. *b b*, the next three timbers, upon which the former rest, each 10¼ inches thick and 12¼ inches broad. *c c*, the two beams on which the former rest, each 9 inches square. The places *d d d d*, are supported by four upright posts, each 12 inches by 9 inches: *e*, the dotted line: *k*, the part supported by the iron cylinder: *l*, the orifice for the tube pipe, 12 inches from the angular support in the direction of the dotted line; and *o* the dipping-place, 10 inches from the former, in the direction of the dotted line *l o*. All the timbers being deal, except the upright posts, which are oak.

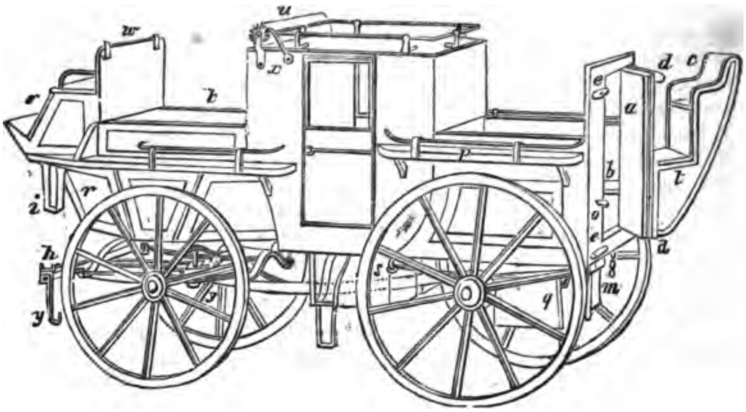


NEW STANDING PRESS.

By Mr. I. L. Pouchee, of Great Queen Street, Holborn.

This improved press is calculated for many purposes besides those of bookbinders, stationers, and printers: for these trades, however, it is peculiarly adapted. We have not seen the press itself, our sketch being taken from a large engraving of it, just published by Mr. Pouchee; but of the advantages attending this arrangement of the component parts, there can be no question, and from its great simplicity, the expense must be very moderate: in power it may be made nearly equal to that of the hydrostatic press of Bramah: it occupies very little space, requires no *stays* either at the sides or the top, and can be worked with a small lever by one person, so as to produce an immense pressure.

There is but little in its structure that varies much from the ordinary press; the head, the bed, the cheeks, the screw, nut, &c. may be considered the same; the chief novelty consists in employing, in addition to these parts, a toothed wheel *b*, fixed on the axis of the screw, which is operated upon by the small pinion *c*, turned by the lever *d*, the latter being shifted on the axis at every fresh pull. The power of the press when brought down to the work, may thus be increased in proportion to the difference of the diameters between the large wheel and the little pinion: the slow operation of the press at this time is of little consequence.



SKINNER'S IMPROVED SAFE COACH.

(From the Transactions of the Society of Arts.)

The model produced before the committee by Mr. Skinner, was considered by the coach-builders and axle-makers present, to combine, in a more ingenious and practical manner, the various improvements which for several years past have been proposed, and in part adopted, in the construction of stage coaches. So large a proportion of the travelling in this country is performed in these vehicles, that all proposals for improving them, by diminishing the labour upon the horses, and the liability of the passengers to accidents from the carriage overturning or breaking down, have been received with great attention by the society, and rewarded if they offered even a probability of success. The lowering the centre of gravity, by removing the heavy luggage and outside passengers from the roof of the carriage; the convenient accommodation of the latter; the adoption of high fore-wheels to ease the draught; and several minor conveniences; will be found to have been duly attended to, and to be combined in the model of which the following is a description.

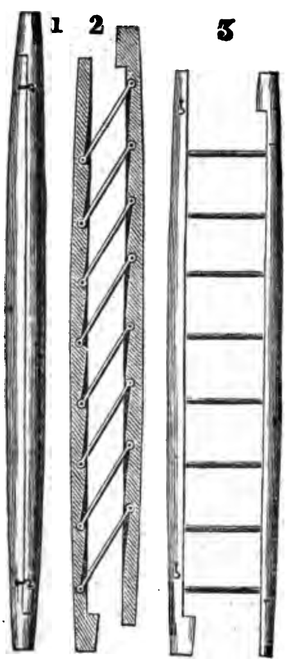
The above figure gives a perspective view of the vehicle. The front wheels are five feet nine inches in diameter. The inside and outside passengers are seated on the same level, the floor being as near to the axletrees, as the play of the springs will admit. *a*, the door through which the hind passengers get up, the seats being situated as shewn at *b*; *c* is a seat for the guard, attached to the door *a*; *d d*, iron bars at top and bottom of the door, projecting enough to be securely held by turn buckles *e e*: the steps *g*, *h*, and *i*, serve for the front passengers and the coachman to get up by; the passengers step upon the boards *j j* on either side, and over the side rails into the compartment *k*; the steps *l*, *m*, *n*, *o*, serve for ascending into the hinder part of the coach; *p p*, boards (on each side) over the hind wheels; there are similar ones, *j j*, over the

front wheels, which have iron rails to hold small luggage. To allow of locking the front wheels, the floor is narrowed in the manner delineated; *q* is the hind boot; *r r*, the front boot; *s*, boxes opening in the floor of the coach; *t* and *v*, boxes opening in the guard's seat; *u*, a roll of leather, to cover the front passengers; it has a slip of iron along its front, which catches on the hooks *w w*; it is wound up and held tight by a ratchet-wheel and latch *x*; the end of the axis is squared to put on a winder; *y*, the locking pin, which plays through the axle-tree: the locking plate is under the floor and above the springs; there are five springs in front, and five at the back, two across each axle-tree, and four across the coach answering to them, and two more, one over each axle-tree, and rubbing on them.

The sum of thirty guineas was presented to Mr. Skinner for this invention, a model of which may be seen in the Society's Repository.

NEW PORTABLE FOLDING LADDER,

By Mr. Green, of Goswell Street.



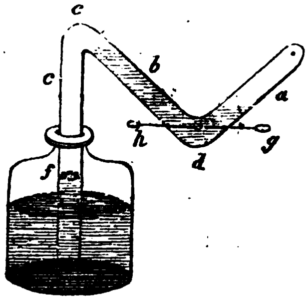
The convenient apparatus delineated in the margin, we have often noticed in passing by the shop of the maker as above mentioned. Its construction, as well as its great compactness and portability, are too apparent to need any observations on those points by us. Fig. 3 shows the ladder opened out for use;—Fig. 2 the ladder partly closed, and shewn in section, that the nature and adaptation of the jointed steps may be rendered obvious;—Fig. 1 shews the ladder folded up close, forming exteriorly a round pole tapered at each end, with all the steps enclosed within it.

Mr. Green has, we are informed, lately constructed a ladder for the purpose of rescuing persons who may have the misfortune to sink under ice; it is said to be admirably adapted to the purpose, and that it affords great security to the person employed as the deliverer; the invention has in consequence, we learn, been approved and rewarded by the Society of Arts; and we hope before the skating season recommences, to have the pleasure of laying it before our readers.

COLLECTING GASES.

An Account of Mr. A. Robertson's simple Apparatus for collecting Gases evolved from Liquids submitted to Galvanic Action. Communicated by the Author to the *Edinburgh New Philosophical Journal*.

This apparatus consists of a glass tube of any size, divided into three parts, *a b c*, in the annexed figure, by the two bendings *d e*. The upper end is closed, and the lower immersed in the fluid contained in the bottle; *f g h* are platinum wires, inserted through the tube near the bending *d*.



To use it—it is to be held with the part of the tube, marked *a*, nearly perpendicular, the open end being upwards, and the liquid, through which the galvanic electricity is to be transmitted, is poured in till the tube be filled. A slip of paper, a little broader than the diameter of the tube, is now to be placed over the orifice, and qeing extended on both sides along the tube, is to be held there so that the whole may be inverted, without spilling into the bottle, *f*, previously half filled with the same fluid. The wires, *g h*, are then connected with the galvanic poles; and when the experiment is finished, the gas evolved at the wire, *g*, will be collected in the part of the tube, *a*, and that from the wire, *h*, at *c*, in the manner represented in the figure, the displaced fluid descending into the bottle.

The volumes of the gases may be ascertained by graduations on the tube, or they may be separately transferred into small jars, by the aid of a pneumatic trough; the gas at *c* ascending into one jar upon the tube being turned up, while the gas at *a* occupies the part of it on each side of the bend, *d*; and this, afterwards, upon a proper inclination of the tube, also ascends into another; so that each of them may be examined by itself. Should it be wished to re-combine them it may be done without removing them from the tube, but by holding it so that the gas at *c* may rise to *b*, and join that in it, and then transmitting the electric spark between the wires.

The advantages of this apparatus, when water or any other fluid, not corrosive, is to be decomposed, consist in its simplicity and cheapness, as, by the aid of a blow-pipe, it may be made in a few minutes from any piece of glass tube of a proper size; and it possesses, also, every convenience of those which are more complicated and expensive. From the points of the wires within it being so near each other, the galvanic action is procured in its greatest intensity, and the products from each wire are, nevertheless, separately obtained. But when corrosive fluids are used, such as the nitric acid, (a substance well fitted for illustrating the action of galvanism in effecting decomposition, on account of the rapidity with which the affinity of its elements is thus overcome) it is much more decidedly superior.

The quantity of liquid used is comparatively small; there is a greater facility of filling or emptying, without coming in contact with the corrosive matter; and from there being only one opening it is more manageable, and there is much less risk of the fluid escaping from the vessels and being thrown about by the pressure of the gas produced.

LONDON MECHANICS' INSTITUTION.

August 8.—At the conclusion of Mr. Preston's second lecture on *Optics* this evening, it was announced to the members, that an election by ballot of fifteen of the committee of managers, would take place on Tuesday the 4th of September ensuing, and that Tuesday the 14th of this month, would be the last day for receiving nominations of candidates.

It was also announced, that Mr. Brayley's fourth lecture on the *Invertebrate Animals*, would be deferred till Friday the 17th, and that no lecture would be delivered at the Institution on the 10th.

COATING OF IRON WITH COPPER.

(Abbreviated from the Franklin Journal.)

Lebanon, January 22, 1827.

Sir,—Through the politeness of a friend, I have been gratified with the perusal of the Franklin Journal for January, 1827, in which I find a notice of a patent obtained by Mr. David Gordon and William Bowser, iron manufacturers, London, for a method or process by which iron is coated with copper, and which is stated as a valuable discovery in the arts, &c. It may, probably, be a valuable discovery; but I am apprehensive, that there must be considerable difficulty attending the process, inasmuch as the iron has to be heated to a degree that will cause it to oxidize rapidly, unless entirely excluded from the air, which appears to me almost impracticable.*

The following process I have been acquainted with for a number of years, and I think it much more simple, much more expeditious when any quantity of the article is required, much less expensive, and attended with much less risk; whilst it requires but little skill in the performance. Take a cistern of wood, of a size suitable for the articles required to be coated; fill it with rain, or river water; put up a small furnace; the best form, I think, is that used in rolling mills for heating iron, with anthracite coal, but it need not be more than one-third of the size. Any other kind of fire, that will produce a uniform heat, may answer; then take scraps of sheet copper, or any other copper most convenient, heat them to a bright red, sufficient to oxidize the surface, but not to melt the copper, then

* That the operation is not impracticable we shall shortly have occasion to shew, by a description of the furnace in which it is performed. *Editor, Register of Arts, &c.*

quench them in the cistern of water; continue to heat, and quench them, until more than a sufficient quantity of copper is oxidized and disengaged, to coat the articles required; stir the water well, and deposit the articles intended to be coated, in such a position that they will be entirely covered, and the water have free access to every part: leave them in this situation, from five to ten days, and they will be completely coated with copper. A kettle, for instance, made of sheet iron, and deposited in the solution, will become completely coated inside and out, and will appear as if made of sheet copper. The longer the articles remain in the solution, the thicker will be the coating, at least so far as my experience goes.

Your's, &c. JOSHUA MALIN.

The Editor of the Franklin Journal, among other judicious remarks, observes, "We should apprehend, that the only action in the case alluded to, must result from the accidental presence of acid, and that in *pure* water, there would be no sensible action. Our correspondent appears to speak from his own experience, and in this, should there be no mistake, he offers a much better test than our theory; as theories are good only so far as they are suggested, and supported by experience. The communication omits to mention, the necessity of a *perfectly clean* surface of iron; without this, however, no coating can be expected. We should be glad to *see* an article covered with copper by the foregoing process."

ART OF LACQUERING IN CEYLON

Ivory, Wood, and other Substances.

[From Dr. DAVY's recent work on Ceylon.]

IN the arts the Singalese have made more progress than in the sciences, particularly in some of the ornamental or fine arts. Of these, painting is the least advanced." *** Ignorant of perspective, and of the effect of light and shade in colouring, their only aim is gaudiness of effect. The pigments they employ are few in number, but of a pretty permanent nature. Their yellow paints were ascertained by Dr. Davy to be, orpiment and gamboge; their blue, a preparation of indigo, containing a good deal of earthy matter; their red, cinnabar and red ochre; their white, a native mineral (a mixture of carbonate of lime, and carbonate of magnesia, nearly in the state of chalk); and their black, lamp-black: all these paints they use mixed with gum. Of oil painting they are entirely ignorant.

Lacquer painting is an art much used by the Singalese, and of which they are very fond. The lacquer they employ is a substance which has never yet been examined, I believe, and which possesses some peculiar properties. It is called by the natives *kapitia*, and is procured from a shrub of the same name (croton lacciferum) of very common occurrence in most parts of Ceylon. "It exists," Dr. Davy observes, "in the sap of the plant, as I have ascertained by experiment: occasionally exuding, it collects on the branches in drops

like gum: It is either of a light yellow colour and translucent, or of a dirty brown and opaque: the drops are generally hollow, strongly adhering, and neither easily broken nor detached: they have no taste but a slight, peculiar, and agreeable aromatic smell. After fusion to get rid of entangled air, I have found the specific gravity of this substance to be 1024. When heated it begins to soften at 150° Faht.; at 220° it is almost liquid, and may be drawn out into the finest threads: in this state it is extremely adhesive. On cooling, when its temperature is reduced below 150°, it becomes solid and hard. Strongly heated, it takes fire, and burns with a bright blue flame. From the experiments I have made on it, it proves to be a resin, that is pretty soluble in ether and alcohol, and almost insoluble in oil of turpentine. In the translucent drops, in which it is almost pure, I could detect only slight traces of gallic acid, and of extractive. In the dirty brown opaque drops, it contains more of these substances, and a good deal of woody fibre, probably derived from the bark. To purify it for use, the natives macerate it about twenty-four hours in an infusion of the albanum of the mimosa cæsia, which is slightly acrid, and dry it, after having well rubbed it in a coarse cloth, and washed it frequently with the infusion, to separate as much as possible of the adhering impurities. To purify it still further, they put the dried kapitia into a long cylindrical linen bag, open at one end, and at the other fixed to a stick. This they hold over a charcoal fire, and when the kapitia is sufficiently softened by the heat, they twist the ends of the bag different ways, applying pressure by tension, till the whole of the resin has exuded, which is scraped off with a blunt knife as it is expressed. They have succeeded in imparting to kapitia four different colours, green, red, yellow, and black: an attempt they say was once made to invent a fifth colour, but it failed. The colouring matter is incorporated by beating with a hammer, the heat produced by the percussion being sufficient to keep the kapitia soft. It is coloured red with cinnabar; black with lamp black; yellow with orpiment; and green, by beating together a portion of yellow resin, and of resin coloured of a dirty bluish-green with indigo.

The lacquerer (when about to exercise his art) seats himself on the ground by a charcoal fire, and arranges his materials around him, as, pieces of kapitia differently coloured, a small stick to fasten the resin to, that he may expose it to the fire, and a bit of the leaf of the Palmyra-palm as a polisher; and besides these, with the exception of a very long nail on the thumb of his left hand, which he uses as a cutting instrument, he requires nothing else for his most delicate work. Whether it be wood or ivory that he undertakes to lacquer, it must be perfectly clean. The resin is drawn out into round threads and flat filaments of various dimensions, as required, and applied cold to the heated surface, to which it immediately adheres. Many of the Singalese perform this kind of work with a good deal of skill and taste, and often produce avery pretty and brilliant effect. It is chiefly used to ornament bows and arrows, spears, sticks, ivory boxes,

priest's screens or fans, and wooden pillars. The excellence of this species of lacquering is its great strength and durability; it lasts as long as the surface to which it is applied, and retains its brilliancy of colouring to the last.

Natural History.

Ephemera.—It has lately been proved that the insects under this denomination, which live only for a few hours, or at most for a day or two, have (contrary to the usual supposition) all the parts of the digestive canal. It has likewise been discovered, that during their brief lives, they twice change entirely their skin.—*American Paper.*

The Camelopardalis, or Giraffa, presented by the Pacha of Egypt to the King of France, is gratuitously exhibited daily in Paris; it is a female, two years and a half old, and stands 12 feet high. It is extremely gentle, and does not appear at all alarmed by the crowds which approach it. The camelopardalis preserved in the Museum at Paris, which was shot by the celebrated traveller Vaillant, is no less than 18 feet high.

Burman Forests of Reeds.—" These cover large tracts of ground, and grow so very close that it is impossible to force a passage through them. They are sometimes twenty feet high; and consequently when a defile of this kind is entered, there is no means of diverging either to the right or left. The reeds being parched by the sun, ignite with the greatest rapidity, and are often set on fire with the friction occasioned by their waving to and fro when agitated by the wind.

" We repeatedly saw the country, for a great distance, in flames, and occasionally approached so close to them, that our ammunition waggons have not been at all in safety. The crackling noise the reeds make when burning, the volumes of flame and smoke which are excited by the breeze, and the rapidity with which the fire extends its dominion, filling the air with sparks, continue to render the situation of a near spectator far from agreeable."—*Two Years in Ava: London, Murray,* 1827.

Geology.

Inundation of the Earth.—A Treatise on the great geological question—whether the continents now inhabited have or have not been repeatedly submerged in the sea—has lately been read at the Académie des Sciences, by M. Constant Prevost. M. Prevost maintains, contrary to the generally-received opinion, that there has been but one great inundation of the earth; and that the various remains of plants, animals, &c. which have given rise to the supposition of successive inundations, have been floated to the places in which they are occasionally found.

Central Fire.—All the observations and calculations which have been made of late years with reference to the internal temperature of the terrestrial globe, seem to establish the theory of a

central fire; that theory which our ancient natural philosophers, and even Buffon himself, considered merely as the dream of the imagination fond of the marvellous.—*Literary Gazette.*

Medicine.

The Croup.—It is mentioned in the French papers that M. Bretonneau, a physician of Tours, having made this disease (so fatal to children) the peculiar object of his study, has at length discovered a certain remedy for it. It consists in blowing alum into the throat of the patient, by means of an instrument contrived by M. Bretonneau for the purpose. Sometimes a repetition of this process is required; in obstinate cases to the extent of five or six times. It is added that very numerous cures have been effected by this simple operation, in cases wherein the disorder had assumed the most alarming symptoms.

Contagion.—Those miasms which emanate from decomposed animal and vegetable matters, and from the bodies of congregated sick persons, are sometimes so deleterious as to occasion debility, and even death, without re-action; but whenever they produce pain and fever, there is established in the digestive organs, (mucous membranes), and often (by sympathy), in other organs, an irritation which furnishes the principal indication of treatment. This is what constitutes *typhus*, and is then the product of infection. *Medico Chirurgical Review*.

Fine Arts, &c.

Burman Books and Writing.—"The Burman books are mostly made from slips of Palmyra-leaf, about 3 inches wide and a foot long; a number of which being fastened together are tied between two thin japanned boards of the same dimensions, which constitute the binding. The Burman character is formed of circles and segments of circles, closely connected; the letters are written from left to right, and are remarkably clear and distinct: they are formed with a sharp pointed instrument resembling the ancient stylus, with which the letters are engraved on the Palmyra-leaf; but this style of writing is peculiar to the Burman language.—*Two Years in Ava.*

Pali Books of Writing.—"The Pali character is totally different from the Burman, the letters being square and angular, and in writing much more trouble is taken in it than the former. The books are generally composed of thin leaves made with the bark of the bamboo, cut into very delicate stripes, and then plaited together. They are covered with varnish so as to be completely smooth, and are not unfrequently gilt, and the characters japanned in black. The binding and the margin of the leaves are richly ornamented with devices and grotesque figures, neatly executed with japan: and sometimes the Pali books are formed of leaves of silver, copper and ivory; the latter, particularly, are very beautiful."—*Ibid.*

Method of Fixing Crayon Colours.—Mr. James Smithson, wishing to transport a crayon portrait to a distance for the sake of the likeness, without the frame and glass, successfully employed the

following process: He applied drying oil diluted with spirit of turpentine to the back of the picture; in a day or two this had become dry, when he spread a coat of the same mixture over the front of the picture. The paper was thus perfectly saturated, and Mr. Smithson observes that he thus converted his crayon drawing into an oil painting.

Mosaic Printing.—Senefelder, the inventor of lithography, has discovered a new mode of printing from painting, which has all the qualities of those executed in oil. He has termed it mosaic printing, and it is remarkable for its beauty, lightness, and durability.—*Foreign Quarterly Review*.

It is probable that a man of Senefelder's genius may succeed in producing a pretty good effect in this manner; but it is absurd to suppose that such printed works can have "all the qualities" of the original painting. When a transparent colour is laid over an opaque one, to produce a mixed tint, the transparent colour only must come off first; and if the opaque one could be taken off with it, the latter would obscure the former, and produce another effect, probably the opposite of that intended by the artist. Other difficulties present themselves, which must prevent a perfect transfer of the original painting.—*Editor, Register of Arts, &c.*

LIST OF EXPIRED PATENTS,

Continued from p. 32.

COOKING.—John White, of Princes Street, Soho, for a machine for cooking without coal or wood.

CALICO PRINTING.—James Thompson, of Clithero, Lancaster, for a method of producing patterns on cotton or linen previously dyed Turkey red.

COLOUR MAKING.—Alexis Delahante, of Great Marlborough Street, for making and applying a green colour.

STIRRUP.—Richard Green, of Lisle Street, London, for a spring stirrup, to prevent accidents.

LIGHTING CITIES.—Lord Cochrane, for his method of lighting cities, towns, &c.

MUSICAL INSTRUMENTS.—Frederick Hank, of High Holborn, London, for improvements in musical instruments.

MANGLE.—Joshua Stopford, of Bedford, for an improved mangle.

SOAP.—William Mitchell, of Edinburgh, for discovering a manufacture of soap.

COOKING APPARATUS.—B. M. Coombs, of Fleet Street, London, for improved cooking apparatus.

ROPE MAKING.—G. Duncan, of Liverpool, for several improvements in rope making.

CHRONOMETER.—S. Rentzsch, of St. James's Square, London, for a hydrostatical and pneumatical chronometer.

HEATING.—B. Deacon, of Islington, for his method of applying air to domestic and manufacturing purposes, and improved fire places.

CARRIAGES.—R. Kittoe, of Woolwich, Kent, for a double-coned revolving axle.

CONVEYING CARRIAGES.—W. Hedley, of Wylam, Northumberland, for certain mechanical means of conveying loaded carriages.

ARSENIC.—R. Edwards, and W. Williams, of Penryn, Cornwall, for a process of extracting arsenic from ores.

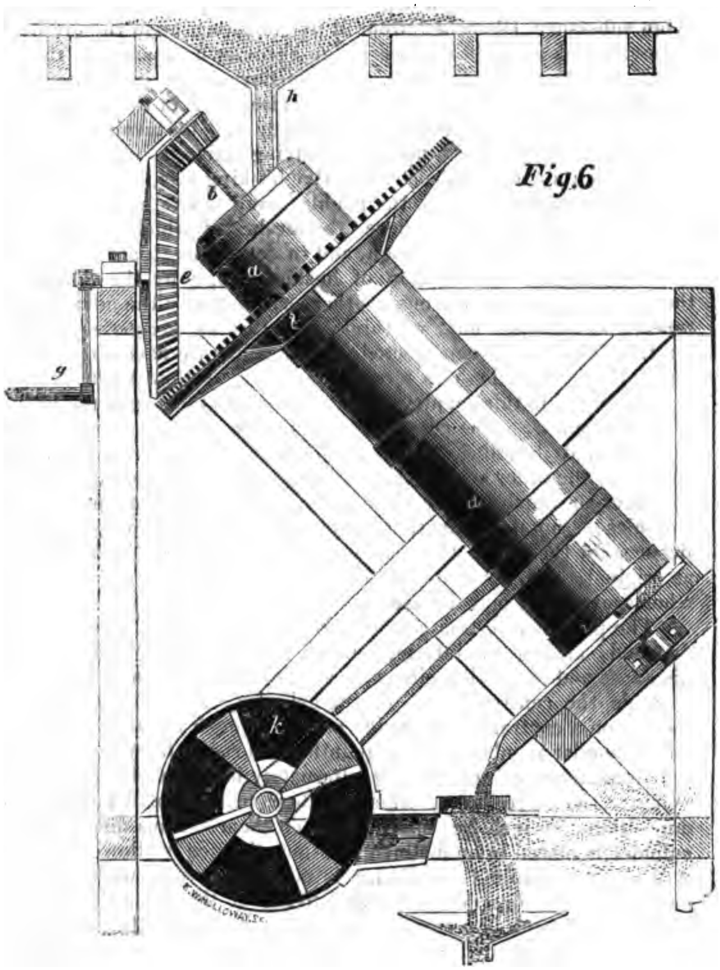
UMBRELLAS.—George Dodd, of Wandsworth, Surrey, for improvements in umbrellas.

APPLICATION OF HEAT.—W. R. W. King, of Union Court, Holborn, London, for an improved method of applying heat to water and other fluids.

CANAL LOCKS.—W. Congreve, of Cecil Street, London, for a method of constructing locks, sluices, &c.

ANCHORS.—Thomas Brunton, of Cooper's Row, London, for improvements in anchors, windlasses, chain cables, and moorings.

DREDGING.—J. Hughes, of Poplar, Middlesex, for an apparatus for raising gravel from the bottoms of rivers and pits.



PATENT MACHINE FOR HUSKING RICE,

By Melvil Wilson, Esq. of Warnford Court, London.—*Enrolled June*, 1827.

The apparatus by which the natives in most countries, where rice is grown, deprive the grain of its husk, is so rude and ineffective, that it is a matter of surprise the experience and wants of society have not until lately caused the introduction of contrivances better calculated for the purpose. A machine for effecting this operation must necessarily be very simple, as the act required consists merely in rubbing the grains against one another, or in contact with some

other substance. Of these two modes the latter is attended with the disadvantage of causing a deposition of small particles from the foreign substance (detached from it by collision) upon the grain; to remove which an additional operation becomes necessary, or the rice would not be proper for food. The inconvenience just stated has, we know, resulted from an attempt to clean rice in the manner that many articles of manufacture are cleansed, viz. by turning the grain round in a barrel fixed upon a revolving axis, in which was also deposited a quantity of pebbles; the husking was, however, thus quickly accomplished, and the pebbles were separated with facility by throwing them upon a sieve, the meshes of which were adapted to let only the rice pass through, and to detain the stones.

To conduct the operation of husking simply by the collision of the grains of rice against one another, has not only the advantage of *superior cleanliness*, but, we think, also that of *greater expedition.* On this principle is constructed the machine we have to describe, which is the invention of a foreigner residing at New York, and has been patented in this country by Mr. Wilson, as the commercial agent of the inventor. The enrolled specification of this patent is very concise, and describes merely a portion of the machine, as represented on the other side of the page, the additions being made by us to render the apparatus more complete, and worthy of adoption in the Colonies;* not doubting that the patentee will be disposed to grant licences for the use of that portion of the apparatus claimed by him as original; and, as respects our additions, they are free gift to whomsoever they may be useful.

The patented portion consists of a long hollow cylinder of metal or wood; around the interior surface of which are fixed, at equal distances and in parallel circles, a series of angular bars, projecting towards the centre or axis of the cylinder; this cylinder revolves loosely on a central shaft, which passes through it, and is provided with a similar number of bars, pointing (as radii) from the centre to the circumference, and passing alternately between the bars in the cylinder, so as to leave, when at their nearest proximity, (or in opposition) an inch free space between them. Thus disposed, the cylinder is placed in an inclined position, the rice is allowed to enter it at the top, while the cylinder is made to revolve with a "slow motion" *in one direction,* the axis moving at the same time at "a high speed," and *in a contrary direction;* consequently, as the rice passes through the cylinder, the grain will be considerably agitated and turned about; and by that means the husks will be *rubbed* off before passing out at the lower end of the cylinder.

To render the construction of the interior of the cylinder perfectly understood, we have annexed the diagrams in the margin.

Fig. 1 represents a plan of the cap of the cylinder, not fixed thereto, nor to the axis, which passes through it, but to the framing which supports the hopper; it serves therefore to guide the grain into

* For the means resorted to, for cleaning of rice by the natives of Ceylon, see page 80.

the cylinder, and to keep out dirt and other adventitious substances."

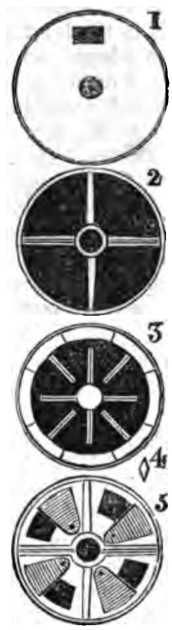


Fig. 2 is called, in the specification, "a socket wheel;" it is fixed directly under the cap to the cylinder, and the axis passes through the socket, which serves, therefore, as a bearing for both the axis and the cylinder, permitting them to revolve freely in contrary directions. For the convenience of removal this wheel is made to divide into two parts, as shewn, which are bolted together when in use.

Fig. 3 gives a transverse section of the cylinder and axis, each of which being shown as provided with four bars, that number being fixed in each parallel circle, and alternately as respects those on the cylinder and those on the axis. This section likewise shows the cylinder as made of wood (with hoops round it) and that it is composed of eight distinct pieces or segments; on each of the eight segments is fixed a longitudinal row of similar bars, though only four (the number in one circle) are brought into view to prevent confusion.

Fig. 4 is a transverse section of one of the before mentioned bars, showing that they are of the figure of a quadrangular prism, that shape being preferred by the patentee for the purpose in question.

Fig. 5 is a plan of the bottom of the cylinder; it is formed in part like the socket wheel, described in Fig. 2, but the spaces between the spokes are closed: in each of these compartments a large aperture is made for the egression of the grain, which is regulated at pleasure by sliding doors to each as represented.

The specification states, that the cylinder may be worked in either a vertical, an inclined, or a horizontal position, and with that view the sketches attached to it (the specification) are apparently designed to exhibit a method of altering the position at pleasure;* the upper extremity of the axis of motion appears (by dotted lines) to be resting on a pivot beam, and to the lower extremity is a regulating screw by which that end may be elevated or depressed at pleasure; the question of the best position of the cylinder is, however, decided by the patentee himself, who prefers it at an inclination of about 45°: we have accordingly thus placed it in our drawing, with the omission of the apparatus for altering its position.

No gearing for communicating motion to the cylinder and axis is either shown in the sketches, or described in the specification, we have therefore taken the liberty of placing such as appeared to us the

* If the alterations in the position of the cylinder be designed to accelerate or retard the passing through of the rice, that object is effected by enlarging or decreasing the apertures at bottom, by the sliding doors as before mentioned.

best calculated to effect the motion intended by the simplest means, and in the least compass; we are aware that the combination of the two wheels and pinion shown is peculiar, perhaps never before proposed or attempted; nevertheless, we are convinced that they will, properly constructed, perform well.

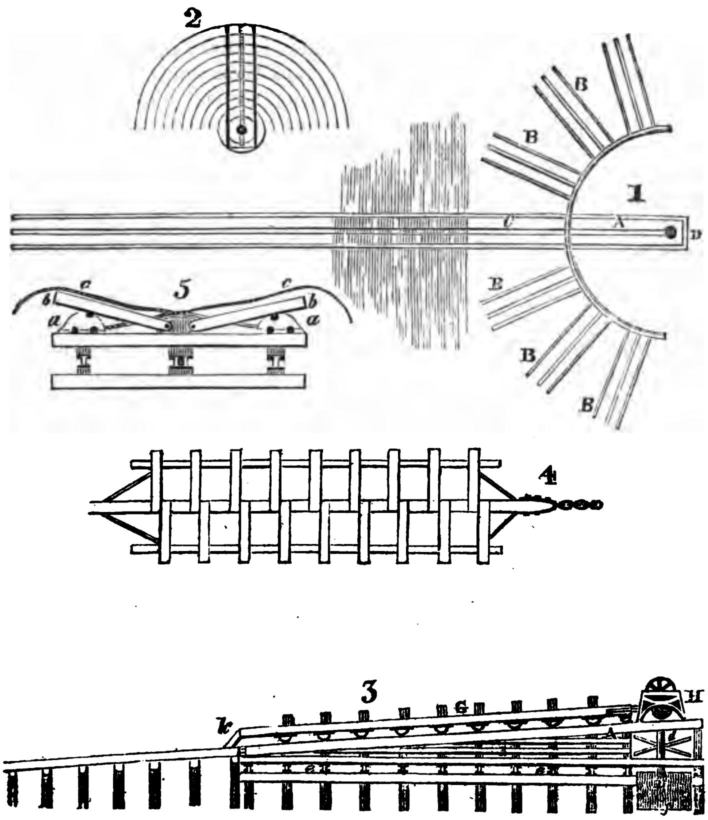
At Fig. 6 the machine is shown complete.—*a a* is the husking cylinder; *b* the axis, turning in plummer blocks at *c c;* on the axis, *b*, is fixed a slightly-bevilled pinion, *d*; at *e* is a bevilled wheel, and at *f* a faced wheel. Motion being given to the winch, *g*, by manual force (or other power), a "high speed" is thereby communicated to the shaft in one direction, and a "slow motion" to the cylinder in a contrary direction: during which the rice from the hopper *h* (shown in section) is continually pouring into the top of the cylinder, and as fast as it is husked running out at the bottom, *i*. Here ends the process as described in the specification, but we have thought it not amiss to propose separating the husks or chaff from the rice as it runs out of the cylinder; accordingly, we suggest the addition of a blast cylinder or winnow, at *k*, which may be actuated by a band passing round the cylinder, *a*, or round a pulley at the back of the bevilled wheel, *e;* the husks may thus be completely separated from the grain at a single operation, in one connected machine, by a very slight increase of power, instead of two operations with distinct apparatus.

RADIATING RAIL-WAYS.

Report thereon, by the "Committee of Inventions" of the Franklin Institute, Philadelphia.

THE Committee of Inventions, to whom have been submitted a Model, Drawings, and Description of the "*Radiating Rail-ways for the Repair of Vessels,*" invented by Edward Clark, of New York, civil engineer, report,—That they have carefully examined the proposed improvement, and consider the plan as offering great facilities, when it is desirable to have several vessels under repair upon the ways at the same time. Morton's Patent Slip, which is in use in Scotland, is of sufficient length to contain two or three vessels; but it is evident that whichever was the last hauled up, must be the first launched, and they must, therefore, be frequently repaired in haste, without being allowed that time to dry, which is, in many cases, a point of great importance: to obviate this difficulty, is the end proposed in the plan now under consideration.

It does not appear, from any thing which has been presented to the Committee, that Mr. Clark proposes any thing novel in the construction of the lower part of the rail-way or of the carriage upon which the vessel is to be drawn up; its distinguishing feature being the means provided for removing vessels out of the direct line of the main rail-way, and of depositing them upon *sub-ways*, for the purpose of being repaired. To accomplish this purpose, the upper part of the rail-way, for a length sufficient to receive a vessel, is detached from the lower part, and is made capable of revolving upon a firm, hori-



zontal platform, a perpendicular shaft from which passes through the upper end of the detached part of the rail-way. This platform is the segment of a circle, but it may, if necessary, present a complete circle. At the periphery of this segment the fixed part of the rail-way terminates, and the detached revolving part commences; this is supported upon the platform by a sufficient number of strong iron rollers, placed transversely on the lower part of the frame work, of which it is formed. The upright shaft, around which the detached rail-way is capable of revolving, is also the shaft of the windlass, by which the vessels are to be drawn up; this detached way may, therefore, be considered as a radius to the circle, of which the platform is a segment.

When a ship is drawn up, and has arrived upon the moveable part of the rail-way, a power may be applied to carry this with its load, to the requisite distance round the circular platform, until it arrives at a *sub-way*, several of which are erected round the platform, forming

produced radii to the circle. These are precisely similar to the main rail-way, with the exception of their not being continued to the water, but only of such a length as to admit of the carriage with its load being lowered, and deposited upon them until the intended repairs are made. In the drawing which accompanies this report, there are represented six sub-ways, and of course, upon such a structure seven vessels might be placed at one time.

The main expense attending the erection of marine rail-ways, is in constructing that part which is under the water, where nearly the whole of the labour must be performed in the diving bell; in the mode proposed by Mr. Clark, one principal way would be sufficient in those ports where many vessels may be required to be hauled up; a considerable number of *sub-ways*, with their appurtenances, might undoubtedly be provided at an expense far below that which would attend the original structure. After maturely considering the subject the Committee are fully convinced of the practicability of the plan, and also of its economy, in those situations where more than a single rail-way would be desirable. When once constructed it possesses the advantage of being capable of extension in the number of its *sub-ways*, whenever it may be required.

Philadelphia, ROBERT M. PATTERSON, *Chairman.*
January 15*th*, 1827. THOMAS P. JONES, *Secretary.*

Fig. 1,—Bird's eye view of the platform and rail-ways.
A, revolving section of the rail-way, which may at pleasure be made to coincide and connect with
BBBB, the radiating or *sub-ways*, or with
C, the main rail-way extending into the water.
D, the shaft or pivot, upon which the section A revolves.

Fig. 2,—represents the revolving section, with its centre, as in Fig. 1, together with the circular iron rail-ways, upon which the cast iron rollers are to run.

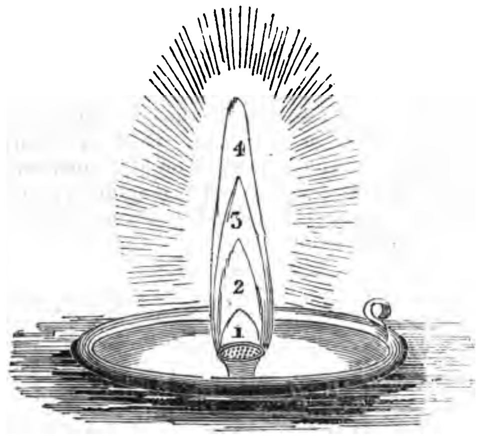
Fig. 3,—Elevation or side view of the revolving and permanent rail ways, supporting a ship's carriage.
A, the revolving section.
B or C, section of the main, or of the sub-rail-ways.
D, shaft for communicating to the windlass the power which is generated at the levers *d*. This shaft is also the pivot around which the section A is made to revolve.
eeee, &c. iron rollers, connected to and supporting the revolving section, on the circular rail-ways.
G, ship's carriage, resting on the inclined rail-ways.
H, windlass, or other machinery for elevating vessels.
i, chain by which the carriage is drawn up.
k, palls, to prevent the carriage from running back.
l, friction rollers, flying between the moveable and fixed ways

Fig. 4,—ground view of a ship's carriage.

Fig. 5,—Transverse view (on a large scale) of a ship's carriage on rail-ways.
aa, cuneiform blocks, moveable on rollers, in appropriate grooves, to prevent lateral motion.

bb, bilge blocks moving on pivots, and resting on rollers adapted to *aa*.

cc, ropes, by which the cuneiform or wedge blocks are drawn up, and the bilge blocks forced against and adapted to the bottoms of vessels.—*Franklin Journal.*



THE GRADUATED NAUTILUS LAMP,

Or New Floating Light.

The improvement which distinguishes this elegant little instrument from the ordinary self-generating oil gas float, being the means of causing the principle to be applied in a manner more extensively useful and convenient, will, it is trusted, gain it the approbation and patronage of all who have occasion for a night or chamber light. The advantage peculiarly belonging to it, consists in its capability of yielding four distinct degrees of flame, so that it may be accommodated to the occasion, a larger or smaller one being used, according as convenient or necessary.

Directions.—Let the instrument float on the surface of the oil; then, by means of the little tongs, place carefully in the recess at the bottom, either of the two rings; apply a light to the top of the glass tube, and a medium flame will be produced, which, by taking out the ring, will be reduced to the first or lowest degree: this may at any time be raised to the second, third, or fourth degree, as suitable to the occasion:—to the second by means of the small ring; to the third by the larger ring; and to the fourth by two rings.* For general service, the second and third degrees will be found most useful; the first when a small, long continued, and economical light is required.

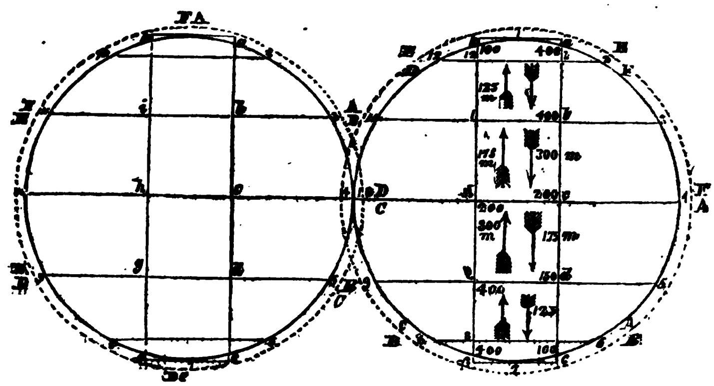
* These little rings operate merely as weights, which, by depressing the tube, occasion a greater supply of oil, and consequently a larger flame. Edit.

The best sperm oil should be used, in a small goblet or other suitable glass vessel: all the trimming required, consists in removing the carbonaceous matter from the orifice of the tube, by means of the pointed tool accompanying the lamp; this should be done every night."—*From a printed circular.*

ECONOMY OF USING HIGHLY ELASTIC STEAM EXPANSIVELY, &c.

By Mr. J. Perkins.

The diagram, Figs. 1 and 2, will show the economy of using steam expansively, and also the method of compensating for the inequality of the pressure on the piston, which, if steam of 400 lbs. to the square inch is used, and stopped off at the quarter stroke, will end its stroke at 100 lbs. per inch. The diagram will also show that the motion of the piston is constantly varying, while that of the crank is uniform in its motion.*



F 1 AA 400	F 1 BB 475	F 1 CC 125	F 1 DD 400	F 1 EE 475	F 1 FF 125
2 AA 275	2 BB 125	2 CC 600	2 DD 275	2 EE 125	2 FF 600
675	600	725	675	600	725

From repeated experiments and much reflection, I am led to believe that there is great economy in using very high steam, and that expansively: that the higher you can practically use the steam the sooner you may cut it off. The diagram shows the gain in cutting off the steam at quarter stroke. Let the piston, which is represented by the line *k* 1 *a*, descend to *i b*, being one quarter of the stroke, with a constant pressure of 400 lbs. per square inch. At this point let the steam be cut off and expand to double its volume; when it

* This diagram does not pretend to mathematical accuracy; the object is merely to explain to the practical mechanic, in a sufficiently clear and concise manner, the principle of the advantage gained by using steam expansively.

arrives at *h c*, it will be exerting a pressure of 200 lbs. per inch, producing a mean of 300 lbs. per inch through the quarter stroke. Let the steam again expand to double its volume, and the piston will finish its stroke at *f e*, at 100 lbs. per inch, giving a mean of 150 lbs. per inch for each quarter, which add to the other two quarters, 400, 300, 150, 150, and the whole sum will be 1000,* giving an average pressure of 250 per square inch. It will be seen that, when the stroke is completed, the cylinder will be filled with steam at a pressure of 100 lbs. per inch, which will be the same in quantity as though the steam had begun with a pressure of 100 lbs. per inch, and continued all the stroke at that pressure. By using the same quantity of steam expansively, beginning at 400 lbs. there is a gain of 150 per cent. If the steam is used at 600 lbs. per inch, and cut off at one-eighth of the stroke, 225 per cent. will be the gain. To compensate for the unequal pressure of the steam on the piston two cylinders should be used, particularly for steam-boats and pumping; where the fly should be dispensed with. With the following arrangement it will be seen, while one of the pistons is at its greatest power the other is acting with a diminished power.

The piston 1, Fig. 1, in descending from *a* to *b*, moves in the same time through only half the space through which the crank moves, as will be seen by its path from 1 to 3. A force of 400 lbs. is exerted on the square inch (that being the pressure of the steam) in the first quarter of the stroke: at this point the steam is cut off, leaving the other three-fourths of the stroke to act expansively. The piston 1, Fig. 2, having completed half its stroke, when piston 1, Fig. 1, begins its stroke, and consequently a compensation near enough for all practical purposes takes place.

It will be seen, that while the piston 1, Fig. 1, has performed one-fourth its stroke, that the piston 1, Fig. 2, has moved from *c* to 6, performing seven-sixteenths of its stroke in the same time. The mean in each quarter, from *c* to *e*, Fig. 2, being 150 lbs. the amount of pressure to be added to the first quarter of the stroke of the piston, Fig. 1, (which was 400 lbs.) is 275 lbs. producing an available power of 675 lbs. at this part of the stroke. The piston, Fig. 2, now moves but two-sixteenths of its stroke from 6 to *e*, and *f* to 8, while the crank moves through two of its divisions, from 6 to 8, which would, in another part of its path, move (within a fraction) with the same velocity of the piston. The piston, Fig. 2, in moving from 6 to *e*, gives a power of 25 lbs. being the last of the expansion which ends at 100 lbs. per inch. The piston, Fig. 2, in moving from *f* to 8, being the beginning of the stroke, gives a power of 100 lbs.; thus a power of 125 lbs. will be acting in the piston 1, Fig. 1, while moving from *b* to *d*, giving a power of 475 lbs. to which add 125, will show a power of 600 lbs. at this part of the stroke. The piston 1, Fig. 1, now descends from *d* to *e*, being the last quarter of

* If the steam had continued the whole length of the stroke at 400 lbs. per square inch, the sum would have been 1600 lbs. consuming four times the steam with the addition of only 60 per cent. to the power.

the stroke, giving 125 lbs. of power to act with the piston 1, Fig. 2, while moving from 8 to *h*, giving a power of 600 lbs.; add to this the 125 lbs. and it will give a power of 725 lbs. at this part of the stroke. The piston 1, Fig. 1, now begins its stroke of 400 lbs. per inch at *f*, and continues to *g* with the same power, while piston 1, Fig. 2, moves from *h* to 12, giving a power of 300 lbs. to be added to the 400 lbs. obtained at the first quarter of the stroke of the piston 1, Fig. 1, at *f* and *g*, producing at this part of the stroke 700 lbs. of power. The piston 1, Fig. 1, now moves from *g* to *i*, giving a power of 475, while the piston 1, Fig. 2, moves from 12 to *k*, and *a* to 2, giving a power of 125; which add to 475, gives a power of 600 at this part of the stroke. The piston 1, Fig. 1, now moves from *i* to 1, being the last quarter of the stroke, giving a power of 125 lbs. while the piston, Fig. 2, moves from 2 to *c*, producing a power of 600; to which add 125 lbs. will make 725 lbs. at this part of the stroke.

By this arrangement it will be seen, that a compensation is obtained, giving a more equable power than that which is produced by the single engine, whether high or low pressure, since it is well known that at two points of the revolution of the crank the power ceases during at least one-sixth of the time, which is the reason that so large a fly wheel is necessary. It is particularly applicable to steam-boats, and may be used to great advantage in the double pump, as well as the balance-bob lifting-pump, used in Cornwall for mining purposes, by the use of proper gearing. The present single stroke expansive engines used in Cornwall for pumping are preferred to all others on account of their economy, although they are very limited as to the extent of the expansive principle, for want of compensation, as nearly the same power is wanted to finish the stroke of the pump as to begin it.

The variation of the velocity of the piston occasioned by the compound motion of the crank and connecting rod is not taken into view in this diagram. As the connecting rod is intended to be four diameters of the path of the crank, the variation will make no practical objection, being, at its greatest value, but one thirty-second part of its range. If the engine should be worked by a connecting rod, as is sometimes the case in steam-boats, say only one diameter of the path of the crank, the variation at each end of the stroke would amount to a practical defect, since the piston would move with nearly three times the velocity at the lowest quarter of the stroke that it would at the first quarter. Thus circumstanced, the crank must be above the cylinder.

As the law of expansion seems not yet to be settled, an arithmetical expansion has been used for this diagram which, from its approximation to the real law, will be quite near enough for practical purposes. Many who are of the school of Tillock and Woolf believe that the expansive power of steam depends upon heat only: while the Soho experiments are said to prove that elasticity depends simply on density, without regarding temperature; viz. that if a cubic foot of steam at atmospheric pressure weighs one ounce, 50 atmospheres

of steam would weigh 50 ounces; but Dalton, who is undoubtedly much nearer the true law, would make 50 atmospheres weigh but about 34 ounces.

I have no doubt that the nearer the atoms of water are made to approach each other by compression, the greater will be the repulsive action of caloric, and that in a more rapid ratio than has hitherto been allowed, especially in highly-compressed steam. Its comparative density with the increase of power diminishes faster than has been supposed even by Dalton.

STATE OF THE ARTS IN FOREIGN COUNTRIES.

With the view of rendering our humble work as extensively useful as possible, we have undertaken to give an outline of the state of the arts as practised in foreign countries; first, by describing the machines, implements, and processes employed therein, for agricultural, manufacturing, or domestic uses; and, secondly, by describing the most improved machines employed in this country for similar purposes, draw a comparison of their respective merits. This measure will, we trust, lead to the adoption of many improvements that are calculated to forward the progress of civilization, and enlarge the sum of human comforts. The *merchant* may thus obtain correct information of the wants and the produce of a country; the *manufacturer* be enabled to prepare more suitable implements and machines for its use (which should be adapted, wherever it is possible with effect, not only to the habits, but even to the prejudices of the natives); and the intended *settler* will thereby be instructed to provide himself with improved substitutes for the rude and inefficient implements and furniture he might otherwise be obliged to use.

Without pledging ourselves to a precise uniformity in our mode of conducting this undertaking, we shall adhere to the plan already laid down as far as circumstances will permit. The papers will be very numerous, and a difficulty may arise with respect to some of them, which we cannot surmount without altering the general plan of our work, which it is of course our intention strictly to maintain. The difficulty we allude to is that of furnishing in every paper improved substitutes for the rude apparatus or processes of other countries, which shall at the same time be perfectly novel to our readers at home; on whose account we feel it to be our duty to exclude detailed descriptions of those simple machines and implements which are well known and in general use in this country. This we say to prevent misconception; at the same time we are fully persuaded that many of our papers, which shall succeed the following one, will be far more interesting in their details, and that we shall be able to connect with the subject of them a variety of machinery of considerable novelty and utility.

Our first papers will relate to the Island of Ceylon, which we commence with out of courtesy to a gentleman of rank, who was so kind as to suggest the undertaking, as likely to prove one of great utility in its results; and to whom we already stand indebted for much valuable information.

When the papers on Ceylon shall be completed our next task will be to give a similar outline of the state of the arts in the great peninsula of India; which will be followed by those of other countries, giving the preference to such as are of the greatest importance to us in a commercial point of view.

In this stage of our proceedings we most earnestly solicit the assistance of such of our correspondents who are in the possession of local knowledge on these subjects, as our resources, though considerable, are not complete.

CEYLON.—N°. I.

In the year 1809 His Majesty's Government in England, with a view of introducing British capital, British machinery, British industry, and British skill, into the Island of Ceylon, authorized, on the suggestion of Sir Alexander Johnston, (then president of his majesty's council in Ceylon,) the Ceylon Government to annul entirely the restrictions which had theretofore (in imitation of the East India Company's Government on the peninsula of India) been adopted against allowing any English, or other Europeans, to possess lands in the island of Ceylon, and *to give every encouragement to Europeans to take grants of land in Ceylon.* In pursuance of this policy, two proclamations were issued, one on the 4th of December, 1810, and the other on the 22nd of July, 1812. These proclamations, which are before us, it is unnecessary to recite, as the substance of them may be comprised in the following extract:—

"Grants will be given to His Majesty's European subjects, and to such Europeans, or their descendants, as were settled in Ceylon before the conquest of it by His Majesty, and who by their good conduct since may have entitled themselves to that indulgence. The quantity of land so granted will not exceed 4,000 acres to any one individual. Such lands will be held free of all duty to government, for a period not exceeding ten, or less than five years. At the expiration of that period the lands will be subject to a fixed rent, liable to be altered at stated periods, but in no instance to exceed one tenth of the actual annual produce. All such grants will be subject to a condition of cultivation and improvement according to the situation and capability of the land, the particulars of which stipulation, and of all other conditions in which a latitude is left, will be fixed in the grants, upon a fair and equitable consideration of the circumstances of each case. Applications to be made by letter, addressed to the chief secretary of government.

"By His Excellency's command,
(Signed) "John Rodney,
"Chief Secretary's Office, Colombo, *"Chief Secretary of Government."*
"July 21, 1812.

For the following information respecting the agriculture of Ceylon, we shall stand chiefly indebted to Dr. Davy's interesting and valuable History of the Island.

Agriculture is in no part of the world more respected or more

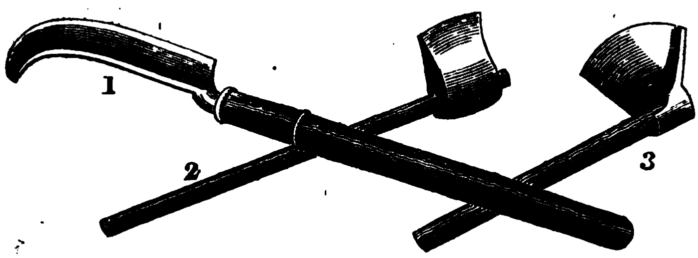
followed, than in the interior of Ceylon. In common with all other arts, it is marked with great simplicity.

Most of the operations in the cultivation of paddy (rice), which is carried on wherever water for irrigation can be procured, are connected with, or have some relation to, the element on which its success depends. The farmer commences with repairing the banks of the paddy-field. He then admits water in sufficient quantity, to be an inch or two deep over the whole surface. After the ground has been well macerated and softened, he ploughs it, still under water. After further maceration, it is ploughed again, or merely trampled over by the buffaloes, till reduced to the state of mud: its surface is now levelled and smoothed. The water is drawn off, and the paddy, having been previously steeped in water until it has begun to germinate, is sown with the hand, and is scattered as equally as possible over the moist surface of mud. When the seed has taken root, and before the mud has had time to dry, the openings through which the water was drawn off are closed, and the field is again inundated. When the paddy is two or three inches high, it is weeded; and where the seed has failed, the vacant spots are planted from those parts which are too thick, and require thinning. The irrigation is continued, till the paddy is nearly full grown, and about to ripen, when openings are made in the banks, and the field is drained. As soon as ripe, the paddy is cut with reaping hooks, and immediately carried to the threshing-floor, where the grain is trampled out by buffaloes. From the moment the seed is sown, to the period of harvest, the paddy-field, like the chenas, requires constant night watching, to protect it from the depredations of its wild enemies. In the low countries, where the cultivation of paddy is in a great measure dependant on the rainy season, and on artificial reservoirs, for a farther supply of water, only one crop is procured annually; but amongst the mountains, in situations where perpetual irrigation is at command, the seasons are less concerned: the farmer can sow when he pleases, and from good ground annually obtain two, and it is said even three crops. One crop a year of the best paddy, which requires seven months, is however the most common: when two crops are procured, they are of an inferior grain, that comes to maturity in three or four months.

The hilly and mountainous districts, in consequence of being well supplied with water, are thus peculiarly favourable for the cultivation of this important grain; and it is a most fortunate circumstance that they are so; otherwise, the coolest, most salubrious, and most beautiful parts of the interior would, instead of being cultivated to a certain extent, be quite neglected and deserted. In the low country, the paddy-fields are generally of a large size, and apparently quite flat; and every crop being in the same state of vegetation or nearly so, the whole exhibits very little variety of surface. Amongst the mountains it is quite different; paddy-fields there are a succession of terraces or flights of steps; and in each field the crop may be in different stages of growth,—in some just vegetating, in others full grown, ripening, or ripe; there,

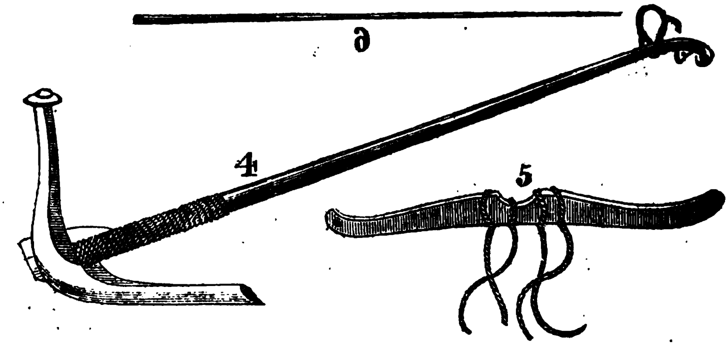
at the same time, you may see the labourers at all their different operations,—banking, ploughing, sowing, weeding, reaping, and treading out the grain. Dr. Davy observes that he does not know any scene more interesting, than a highland valley thus cultivated, or more beautiful, when (as it generally is) it is surrounded by the bold, wild, and frequently savage scenery, of untamed nature. In the low lands, the labour and skill required to cultivate paddy, are less than are necessary in the high lands. In cutting terraces in the sides of the hills, the perseverance and industry of the mountaineer, are often in a striking manner displayed. Many of the beds are actually walled up, and many of them are not four feet wide, and though generally long, occasionally they are so short, from the nature of the ground, as well as narrow, that one would not suppose they were worth the labour of keeping in repair, much less that of making. In bringing water to his fields, and insuring them a constant supply, the judgment and skill of the cultivator are most exercised. Sometimes it is conducted two or three miles along the side of a hill, and occasionally it is even carried from one side of a mountain to another by means of wooden pipes.

The implements of husbandry employed by the Singalese are few in number, of a very simple description, and resemble ours in many particulars. For cutting down trees and clearing underwood, they have a *wal-dakat*, or jungle-hook, Fig. 1, and a *proa*, or axe, Fig. 2: their *udala*, Fig. 3, Dr. Davy states (we think erroneously) is for digging where the plough cannot be used, and for banking.



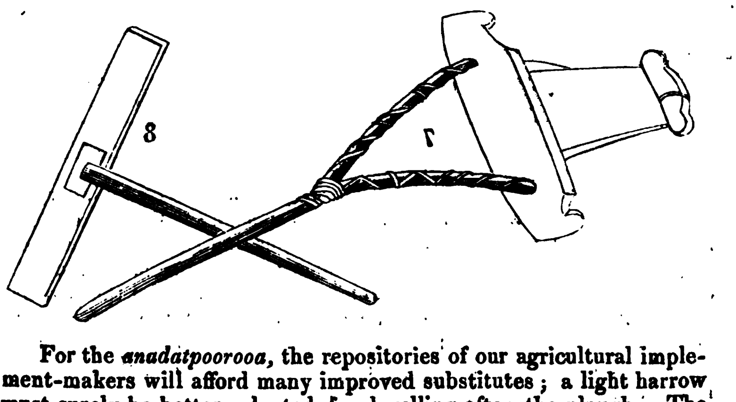
Similar instruments to these, but superior in their quality, may be procured of our own manufacturers. We do not remember to have seen any thing exactly like Fig. 1 ready made, but an excellent substitute will be found in the heavier kind of West India matchets, used for cutting down sugar canes. Fig. 2 is, decidedly, our common felling axe for trees, the only material variation being in the pole or thick part at the back, which in the Singalese is rounded or made convex, while ours is made flat in that part, and is used by the carpenters frequently in lieu of a heavy hammer. Fig. 3 is in all respects like some of our country axes; that peculiar manner of forming the eye for the handle is defective, and is only adopted as a readier and cheaper way of making the tool; the eyes in the best axes are always made the length of the pole, as in Fig. 2.

The Singalese plough, *naguela*, is of the simplest and lightest kind, as delineated at Fig. 4; this plough is attached to a yoke, *viaga*, Fig. 5, and drawn by a pair of buffaloes, the husbandman holding the plough by one hand, while in the other he holds a goad, *kaweta*, Fig. 6, with which, and his voice, he directs and stimulates the animals.



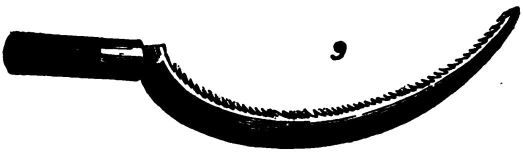
As a substitute for this miserable machine for tillage, it is gratifying and encouraging to learn, that the Scotch plough, drawn by elephants, has lately been introduced by some new settlers, with eminent success; its potent operation in accelerating the work, has, we understand, made it a great favourite with the natives.

For levelling the ground after ploughing, the *anadatpoorooa*, Fig. 7; which, like the plough, is drawn by a pair of buffaloes, the driver sitting on it, to give it momentum. For smoothing the surface of the mud, preparatory to sowing, the light hand instrument, the *atpoorooa* or *goelalé*, Fig. 8, is employed.



For the *anadatpoorooa*, the repositories of our agricultural implement-makers will afford many improved substitutes; a light harrow must surely be better adapted for levelling after the plough. The blade of the *atpoorooa* would of course be better of sheet-iron than of wood.

The reaping-hook, called by the Singalese *guygon-kopana-dakat*, Fig. 9, has a fine serrated edge. This reaping hook is made rather clumsier than ours, but in other respects is the same: the manufacture of this article in England is superior in quality to that of all the world, and at an inferior price.



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After reaping, the grain is trampled out from the straw by buffaloes, upon a floor made of beaten clay. For separating the chaff from the grain, they use the winnow, *coola*, delineated at Fig. 10, which is composed of strong matting and a frame of tough twigs. The husking is of course but very imperfectly done in this way, accordingly, the Singalese use subsequently a pestle and mortar, for completing the operation of husking, preparatory to pounding it for food. These pestles and mortars, *wang-gadea*, represented by Figs. 11, 12, and 13, are generally made of wood, though sometimes of stone.

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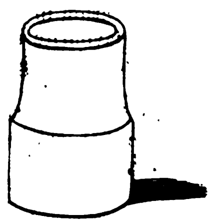

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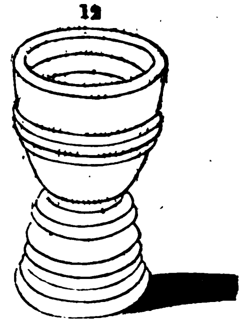

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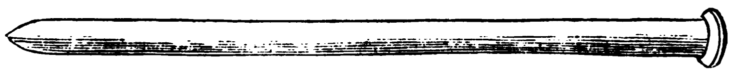
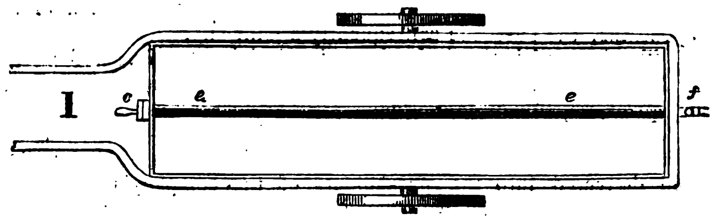
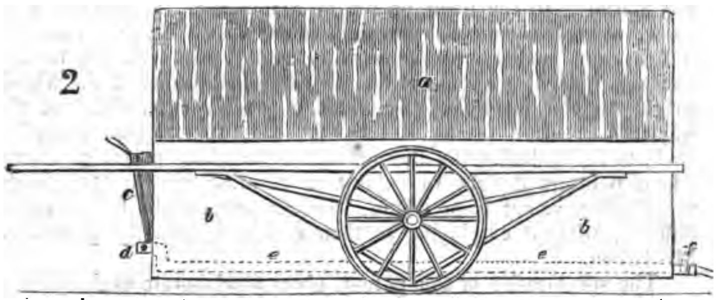


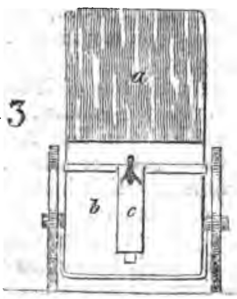
For the *coola*, we submit that an English blast-cylinder or winnow would be a vast improvement, especially if used in combination with the new patent machine for husking rice, delineated at page 65, and described in the subsequent pages;—we have, indeed, delayed our publication of this number one day beyond the regular period, in order that we might be able to contrast the new patent machine alluded to, with the inefficient apparatus employed by the Singalese, and we do with great confidence recommend its adoption in the rice countries.

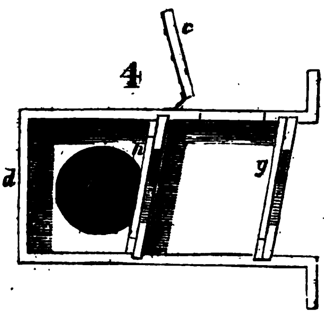
For the *wang-gadeas*, our English cast iron pestles and mortars would form cheap and capital substitutes.

(To be continued.)









THE PATENT ITINERANT GASOMETER,

By Messrs. Coles & Nicholson, of Manchester.—*Enrolled August*, 1827.

A gas company having been some time since established in Manchester, for the preparation and delivery of *compressed* gas, in Mr. D. Gordon's portable gas lamps, it has very recently been determined by the company, that an important addition might be made to their useful establishment, by combining with it the means of delivering gas in the *un*compressed state, (or, as we should rather say, in its natural volume, under common atmospheric pressure); an invention for the purpose having been previously made, and a patent granted for it to Messrs. Coles and Nicholson.

The latter gentleman is engineer to the Manchester company, and having assisted Mr. Coles (the projector) in the perfection of his apparatus, the patent is consequently a joint one.

To accomplish the desirable end, of giving the favoured people of Manchester just so much of gas as they like, and no more, a large recipient, capable of holding more than a thousand cubic feet of gas, is mounted upon wheels, and being filled with gas from the *gasometer** at the works, is transported about the streets of Manchester, and delivered into the gas-holders of the company's customers. This itinerant vessel, (we believe the company call it *a gas-cart,*) though of such gigantic dimensions, (as above mentioned,) is in no way alarming to the good people of Manchester, since they must know, as an Irishman just now said to us, that it is lightest when it is full, and loaded most when it is empty, and reduced to half its size; indeed, were it not for the careful additions of the wheelwright to the machine, just fears might be entertained of the wayward creature taking it into its head, to make an excursion aloft, to light, during the absence of the sun, those pretty creatures, whom painters delight to exhibit as residing among the clouds, to collect payment from whom, the company might find it rather difficult, without employing as their collector, that flying wonder, Mr. Green.

The specification of this patent, gives an elaborate explanation of various modifications of the apparatus, and of several ingenious modes of making the recipient gas tight, some of which we purpose noticing at a future opportunity. Our present intention, is merely to give an outline of the construction of only one modification, that which we presume is adopted by the company.

Fig. 1 represents a plan of the cart with the top of it removed. Fig. 2, a side elevation; and Fig. 3, a front elevation. Fig. 4 is merely an enlarged section of the box marked *d* in Fig. 2.

The recipient is composed of two distinct parts, or halves, *a* and *b*; the upper part *a* is made of some flexible material, impervious to gas, and the lower part *b* of some stiff or comparatively inflexible substance; when the vessel is empty, the part *a* turning itself inside out, falls down inside of *b*. The vessel is filled, by forcing the gas from the works, through a pipe which is screwed into a nozzle at *f*, provided with a stop cock, which is turned off after the recipient is fully inflated, and the supply pipe from the works removed. The machine then sails along the streets, and stopping at a customer's door, one end of a flexible pipe is screwed into the gas-holder of the house, and the other end into a nozzle in the box *d*, which communicates with the interior of the recipient by means of intermediate valves, shewn at Fig. 4. The gas exhauster *c*, is then put in motion by the handle at top, which at every exhausting stroke, is filled with gas from the gas-cart, through the valve *g*, Fig. 4, and by the forcing stroke is discharged through the valve *h*, and along

* We beg pardon of our learned readers for using this silly, but best understood term.—EDIT.

the flexible pipe, into the gas-holder of the house, until the required quantity is transferred. The gas-cart thus proceeds from house to house, until the whole *load* is discharged. Along the bottom of the cart is a pipe *e*, connected at one end with the stop cock *f*, and at the other with the box *d* of the exhauster, and perforated with numerous small holes, for the purpose of allowing the passage of the gas along the bottom of the cart, when the flexible top lies over it.

PATENT ENAMELLED CARDS.

By J. G. CHRIST, of the Strand, London.—*Enrolled August*, 1826.

MOST of our readers have probably seen the beautiful white enamelled cards manufactured by Mr. Christ, the specification of whose patent being just enrolled, we have given it a perusal, and have now the pleasure of describing the process, which is as follows.—

One pound of parchment cuttings, a quarter of a pound of isinglass, and a quarter of a pound of gum arabic, are to be boiled in an iron pot or other vessel, in 24 quarts of pure water, until the solution is reduced to 12 quarts, when it is to be taken off the fire and strained clear. The solution of this consistence is then to be divided into three equal portions of four quarts each; to the first of these portions is to be added 10 pounds of *pure* white lead (previously ground fine in water) which is called *Mixture No.* 1; to the second portion 8 pounds of pure white lead, forming *Mixture No.* 2; and to the third is to be added 6 pounds of pure white lead, making *Mixture No.* 3. The sheets of paper are then to be stretched out flat upon boards, and brushed over with a thin coat of No. 1 mixture, with a common painter's brush; the paper is then to be hung up to dry for 24 hours: after this, the paper is in a similar manner to receive a coat of No. 2 mixture, and dried again for 24 hours; the paper is then to undergo the same process with No. 3 mixture, and dried for 24 hours more. It is now to be printed with the engraved plate, and the press board used for the purpose is directed to be of smooth cast iron instead of wood. The printing being completed, the paper is to be hung up a fourth time for 24 hours to dry; after this, it undergoes the final operation of receiving its high gloss, which consists in laying the work with its face downwards on a highly-polished steel plate, and then passing both together with great pressure between a pair of cylindrical rollers: and thus the beautifully polished surface of the steel is transferred to the composition on the paper, which closely resembles the finest white enamel.

It is to be regretted that this enamelled surface is not very durable, as it comes off after wetting it slightly with the finger. A considerable competition in the preparation of enamelled paper or cards has been excited among the manufacturers, by the eminent success which has attended Mr. Christ's career in the undertaking: former processes for producing similar effects have been renewed and encouraged by the trade; and we have particularly noticed that the cards sent out by Messrs. Shaw and Sons, of Fetter Lane,—and Mr. Alfred

Storer, of Pentonville,—while they possess the high polish of Mr. Christ's manufacture, will sustain bending without cracking, and retain their polish after being wetted.

PATENT APPARATUS FOR CLEANING PADDY, OR ROUGH RICE.

By Messrs. Lucas & Ewbank, of Mincing Lane. *Enrolled May*, 1827.

The specification of this patent states, that it is for improvements upon a patent, granted in the year 1819, for the same purpose, to Mr. Ewbank, one of the parties in the present grant, which consists in some slight variations from the former process; found, nevertheless, to be essential to the perfection of the operation, and a more economical mode of preparing the rice for market.

The specification of the present patent, briefly recites the process described under the former, by which the improvements subsequently made, will be better understood; it consisted as follows:

The rough rice or paddy was first cleansed from dirt and other foreign matter, by passing it over a screen, which, detaining the rice, allowed the impurities to pass through. The paddy in this state was taken to mill-stones, set at a proper distance apart, to rub off the external shells or husks; the husks are next blown away by a fanning machine; the rice thus partially cleaned, is then deposited in mortars, where it is beaten and triturated for depriving it of the thin under pellicle, or red skin; and when the trituration has been carried far enough, the contents of the mortars are sifted upon a "sloping and revolving screen," which is composed of three distinct wire cloths, of different degrees of fineness. The finest under cloth allows the dust or flour to pass through, but detains the broken rice; the second or middle cloth separates the broken, and detains the whole rice, while the coarsest upper cloth allows only the whole rice, or husked grain, to pass through, and detains the unhusked, which is taken back to the mill-stones, to be operated upon again. The rice, still but imperfectly clean, was afterwards taken to the polishing and whitening machine, which consists of two cylinders placed concentrically; the exterior cylinder was fixed or stationary, and the interior one, which was made to revolve, was covered with sheep skins with the wool on, and stretched upon boards or other proper framing, with the wool on the outside. Between these two cylinders the rice was put, and the inner cylinder being made to revolve (by the action of a steam engine or other prime mover) the rice was brushed by the constant friction of the wool, and thereby polished and whitened; in other words, brought to a state fitted for the market.

The foregoing comprise the substance of the processes described in Mr. Ewbank's specification of the patent of 1819. The second patent, granted jointly to Messrs. Lucas and Ewbank, in May, 1827, relates to certain improvements upon the former, and is confined to a superior method of treating the rice, after it has been

deprived of the external shell or husk by the operation already described, or by any other mode. This improvement is founded upon the observation, that the thin under pellicle of a reddish colour, which remains upon the grain after it has been shelled, is of a glutinous or gummy nature, and that the beating and triturating it in the mortars, occasioned the mass to become very sticky and difficult to operate upon towards the close of the process; and that that portion of the rice which had already been stripped of its red pellicle, became injured in its colour, by continuing the process until the remainder in the mass had also been deprived of their red pellicles. To avoid this inconvenience, Messrs. Lucas and Ewbank now use successively two or more sets of mortars, for conducting the last-mentioned operation, in this manner: when the gummy or glutinous matter begins to disengage itself, (which is immediately manifested by the rice moving sluggishly under the pestles,) it is to be taken out of the first set of mortars, and carried to a second set, wherein is to be mixed with the rice, a quantity of the external husks well dried, in the proportion of one fourth or two fifths in bulk to that of the rice. The triturating and beating process is then renewed upon this mixture, the dry husks greatly assisting in cleaning and whitening the grain. After this the mass is to be fanned and screened, to separate the refuse, when the rice is taken to the polishing machine as before described, which terminates the process. The fanning and screening is to be done as often as may be found necessary, between each triturating process, which may extend to three or four distinct operations, according to the quality or state of the rice.

The patentees observe in their specification, that they consider the stickiness of the rice to be owing to the humidity of the climate of this country, or to a certain dampness which it acquires in its voyage, as the difficulty they experience, has not been noticed in the rice mills employed in the Carolinas and elsewhere.

PATENT PROPELLING MACHINERY,

Invented by G. H. Palmer, Esq., of the Royal Mint.—*Enrolled March*, 1826.

This invention is so simple, both in its construction and application, that we have deemed it unnecessary to introduce any explanatory engravings. It consists of chains passing horizontally along the sides of a vessel, or along the bottom between false keels; with paddles jointed to a guide frame, to which they are attached in such a manner, that when the chain is drawn in a direction from stem to stern, the paddles will be kept in a perpendicular position by small check chains proceeding from the lower extremity of the paddle to the main chain or guide frame, in an angular position; thus forming a resistance to the water, which propels the vessel forwards as the chains with the paddles are dragged backwards. When the horizontal parts of the chains are returned or moved from stern to stem, the paddles fold up and take a horizontal position with the chains, and

therefore, form no resistance in passing through the water. The chains are kept in their places by passing over guide pulleys at each end of the horizontal or lower ports, and over wheels at the upper ports. The wheels are furnished with spikes on their peripheries, which take into the links of the chains. These wheels are put in motion by a band passing over a drum in connexion with a steam engine, and round a small rigger attached to the axis of each of the spiked wheels.

When the paddles have been made to traverse their assigned distance along the vessel in the direction from stem to stern, they are returned to their first position by reversing the motion of the spiked wheels.

If the paddles are used on the sides of the vessel, the spiked wheels and guide pulleys are attached to triangular frames, which are firmly fixed to the sides. But if they be applied to the bottom of the vessel, which the patentee recommends when they are used for barges in canals, as they will in that case agitate the water less, and consequently do less injury to the banks of the canal, they must be placed between false keels. In this case the same spiked wheel will serve to give motion to both chains at the same time, by passing them round it in contrary directions. Hence one paddle or set of paddles will be kept in action while the other is returned through the water in a horizontal position.

ON THE VALUATION OF SPIRITUOUS LIQUORS:

By Mr. Wm. Gutteridge.

This very important subject, is perhaps less understood by those the most deeply interested in it, of any other branch of business whatever.

This is not a little strange, when it is considered, that it was recommended by the government to the consideration of the Royal Society, upwards of thirty years ago. Upon this call, *Sir Joseph Banks* selected the most able gentlemen of the Royal Society, to carry into execution this expressed desire of the government. *Doctor Sir Charles Blagden* was at the head, and he availed himself of the ablest assistance, both foreign as well as English, to conduct a minute, scientific, and practical course of experiments. After a most lengthened and elaborate process, twice repeated, and a general correction of every discrepancy of their first results, which occurred through the mechanism, reports were drawn up for the information of the Revenue Boards, and read before the Royal Society, detailing, at great length, the results at which, after the greatest possible care, they had arrived. The last report, which was read before the Royal Society on the 19th of June, 1794, contained the necessary *data*, upon which the then and now prevailing system might be advantageously reformed, of valuing spirits. It was stated, in positive terms, that no method admitted of perfect accuracy, but that of specific gravity; and that the value ought to be estimated upon the alcohol contained.

A table prepared by *Mr. Gilpin*, clerk to the Royal Society, under the dictation of Sir Charles Blagden, was prepared, containing, at every heat from 30° to 80° inclusive,—1st, the proportion of spirit and water by weight. 2nd, the specific gravity produced by the mixing them. 3d, a fixed quantity of pure alcohol of ·825 specific gravity when at 60°, with which the various quantities of water were mixed. 4th, the quantities of water by measure in the mixture, agreeing with the specific gravity. 5th, the bulk of the mixture after concentration. 6th, the diminution of bulk from concentration. 7th, the proportion *per cent.* of alcohol in the mixture, by measure, at the heat of the table. 8th, the proportion, in unity, which the alcohol in the mixture bore at 60°, to the mixture at every other temperature, for reducing the quantities by weight, in any mixture of pure alcohol and water, to those by measure, and for determining the proportion by measure, of each of the two substances in all such mixtures. But, strange to say, not a single suggestion of *Sir Charles Blagden* has, up to this hour, been acted upon.

The Act of the 58th G. III. c. 28, defines proof spirits, as being of a weight equal to $\frac{12}{13}$ths of that of distilled water at 51°. When this Act passed, which establishes the hydrometer called *Sikes's*, the distilled water was 1 at 60°, but is now taken as 1 at 62°. This, however, cannot affect the Hydrometer Act; consequently, as the specific gravity of water at 51° was then taken at 1.00063, the specific gravity of proof spirit at the same heat was .9236, &c.

That all human contrivances partake of imperfections there can be no doubt; but we may convince ourselves, if we take the trouble, that any thing more perfect in its kind than the results of the labours of those gentlemen, is not to be desired.

The commissioners of weights and measures have a clear view of the importance of the recommendations of *Sir Charles Blagden*, else why give us a gallon which is its very root: and the solicitor of the Excise must have an equally clear view, else why the 76th and 77th sections of the 6th G. IV. c. 80.

The weighing of spirits is a practice by no means new, but the doing so upon correct principles *is* new.

A table for weighing spirits, when the legal strength was 7 per cent. over proof, was prepared and used without reference to heat; consequently, the law requiring the delivery of spirits by measure, could not be adhered to, as the quantity delivered by weight, would be greater or less than the true quantity, at the various oscillations of temperature above and below some *one* heat, which *one* heat was not even inserted in the table: and another act changed not only the size of the gallon to be used, but also the degree of strength of the spirit: yet, the only change which took place in the tables, was a change in relation to the quantity of the capacity of the gallon, without reference to the altered weight of the spirit to be legally used: and this second set of tables, like the former, did not specify at what heat the weight would agree to the measure. This

was, however, discovered by the trade, who, demurring, were supplied with another set, very different in weight to the rejected one, but equally defective:—neither specifying at what heat the weight agrees with the measure, by which the law compels the trade to deliver, and when the discovery is made, providing no means of remedying the perpetual inaccuracies, arising from assuming a fixed weight to an ever varying quantity, instead of providing for a fixed quantity, eternally varying in the weight of an equal bulk of the same matter. To remedy this inconvenience, I was called upon to meet a committee of the rectifying distillers of the metropolis, at the Commercial Chambers, Mark Lane, on the 23d and 30th of July last, when it was resolved upon, unanimously, that I should calculate a new set of tables, shewing the weight, at different heats, of any quantity *of all the legal* strengths of England, Ireland, and Scotland.

[*We regret the necessity of postponing the insertion of the remainder of the ingenious author's communication, until our next number.* EDIT.]

STATE OF THE ARTS IN FOREIGN COUNTRIES.

CEYLON.—N°. II.

[Continued from p. 64.]

OUR last paper was concluded with a description of the pestle and mortar in common use with the Singalese for husking and pounding their rice. For reducing *hard brittle* substances into powder the action of the pestle and mortar is very potent, and we know of no mode of applying its power by manual labour with equal effect to that contrived by us, and described with an engraved illustration in the 56th number of the Register of Arts and Sciences, vol. iii. But the pestle and mortar is an apparatus so unsuited for operating upon raw grain, that the late governor-general of Ceylon, Sir Thomas Maitland, was induced on his return to this country in the year 1812, strongly to recommend to the Secretary of State for the Colonies the taking of measures for the introduction of machinery into Ceylon that should be better adapted for the cleaning of rice. In consequence of this recommendation, Thomas Hoblyn, Esq. of Sloane Street, was officially instructed to superintend the carrying of the plan into effect, which was attended with very satisfactory results.

In an interesting communication made to the Society of Arts, Mr. Hoblyn observes that,—"instead of the *breaking* system, it occurred to me that trituration might be successful; and under this impression I had several experiments tried on corn mills, and particularly on the sort of mill where oats are husked for the making of grits. This answered tolerably well in detaching the outside shell, but it had no effect whatever upon the fine cuticle which surrounds the grain, after this had been removed; it was then found necessary to have recourse to some other plan to render the grain perfectly white, and after several ineffectual experiments the mode now practised was that

which was fixed upon as being the means of most effectually completing the process.

"The mill consists of a strong iron framing, supporting by columns a platform about twelve feet square, and ten feet high; upon this platform there are placed at equal distances four pair of horizontal stones, four feet six inches diameter, driven by wheel-work contained under the platform, and supported by a framing of iron fixed to the columns. The mill is placed at about ten feet from the fly-wheel of the engine, and receives its motion by a shaft coupled on the end of that which carries the fly wheel, having a bearing from its other end on the framing of the mill; on this shaft is a bevil or mitre-wheel four feet diameter, with cogs, working in another of the same size on an upright shaft in the very centre of the mill; there is also on this upright shaft a spur-wheel, seven feet diameter, working like the last-mentioned bevil-wheel, horizontally; this large wheel has cogs or teeth in its rim which work into four pinions or small wheels, two feet six inches diameter, fitted on the spindles of the stones, and drives the four pair at once; all this wheel work is so proportioned, that when the engine makes thirty revolutions, the stone makes 84.

"The under stone remains stationary, being wedged part into a circular hole in the platform; in the centre is a hole through which the spindles come from below; in this hole a brass socket is fixed to prevent the spindle from wearing, and the upper end of the spindle stands six or seven inches above the stone.

"The upper surface of the stone being made perfectly flat and true, and laid quite level, it is punched full of small holes about a quarter of an inch deep, and three-quarters of an inch apart.

"The upper stone or runner is prepared in the same manner, and exactly balanced on the top of the spindle, with its under surface fitting perfectly true to the upper surface of the nether stone. The hole in the centre of the upper stone is large, and has a cross fitted in it to form the centre socket which fits upon the spindle, so that between the arms of this cross the grain turned in can fall upon the nether stone round the centre.

"The stones being thus prepared, and the mill in motion, the upper stone revolves with great velocity, while the nether stone is fixed; the lower end of the spindle or pivot on which the stone turns is planted upon a strong iron lever, which can be raised or lowered by a screw, and by this means the falls of the stones can be adjusted by the miller either when the mill is in action or motionless, with the greatest possible facility.

"The stones are covered by a hoop or case, which entirely encloses them, leaving a space all round between the stone and the hoop of about two inches; on the top of the case is fixed the hopper, which is filled with paddy; it falls through a hole in the bottom of the hopper into a shoot, and is conveyed into the hole in the centre of the upper or running stone; it then falls through the arms of the cross before described upon the face of the nether-stone round the centre. The stones being in rapid motion, the paddy finds its way between the faces of the two stones which are now supposed to be set at about the length of the grain apart; the grains are carried by the centrifugal force from the centre to the extremity of the stones, and thrown out in all directions into the case or hoop which surrounds the stones; in one side of this hoop is a hole through which the rice in this state runs out.

"The stones should be set, in the first instance, with great care, for if they are too near, the rice will be broken, and if too far apart, the paddy will get through without being touched; but, when set at the right distance, the husk will be completely taken off, and the rice not broken.

"One pair of stones will husk from eight to ten bushels an hour with ease; the rice runs from the cases upon a fine sieve kept agitated by the mills; in passing over this, the dust and sand are separated; it then falls into the winnowing machine, which is to separate the husk from the rice; this is done by causing the husk and rice together, as they left the stones, to fall in a gentle stream through a current of air excited by a succession of fans revolving upon an axis, and driven by the engine in its passage through the current; the husk

being much lighter than the rice is blown away, and the rice falls into a bin below.

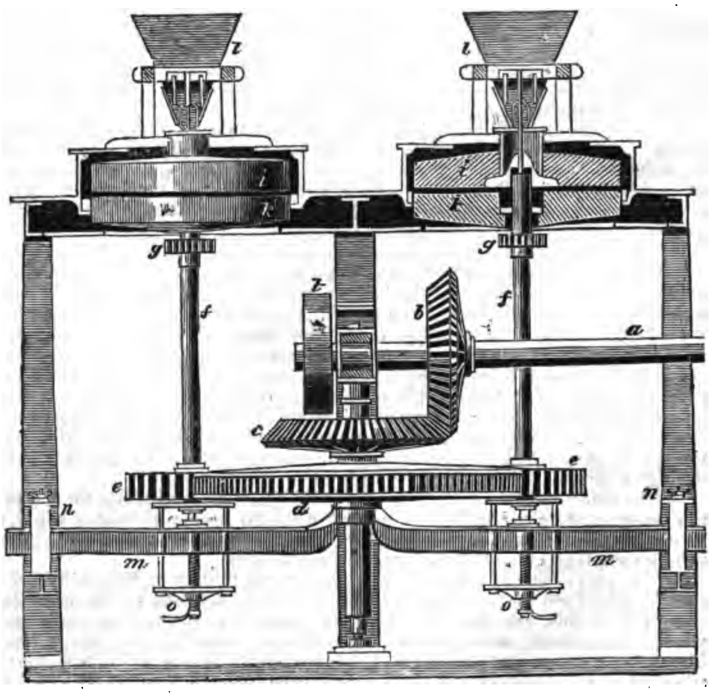
"There is one of these machines to each pair of stones, to separate the rice from the husk, in its passage from the stones to the bin; this part of the operation is most completely performed, and keeps pace with the stones.

"The rice in this stage of the operation is more or less red, nothing more being done than the separation of the husk; after this, it is taken to the whitening machine, where the inside cuticle or red skin is detached.

"This machine consists of a stone of coarse grit fixed on a spindle like a grinding stone; the stone is inclosed in a box or case made nearly to fit, leaving a space all round of about an inch between the stone and the inside of the case; this case is made of plate iron, and punched full of small holes like a grater, with the rough side inwards; it is so contrived that the case may go round with the stone, or it may remain still while the stone is turning.

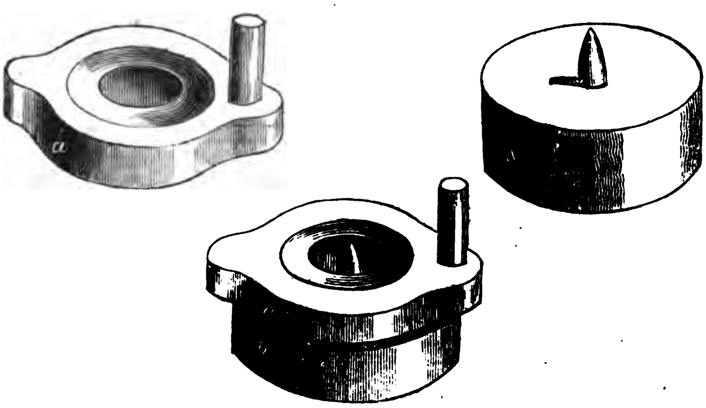
"The rice is put in between the case and the stone, at a sliding door or opening in the rim; the space is about two-thirds filled; the stone is then put in very rapid motion, making at least 250 revolutions a minute by a strap; the case is allowed to turn very slowly; this changes the position of the rice, and every grain in succession comes into contact with the stone, and, rubbing hard against each other, an accumulation of heat (which produces an enlargement of the grain, and consequently splits the red skin), is produced, which serves to loosen the skin; and this, forming a red dust, finds its way out of the holes in the case, and leaves the rice perfectly white.

"In the whole process there is little or no loss, for when the stones are well adjusted very few grains are broken, not more, perhaps, than 5 per cent. upon the whole, and those very partially."



Reference to Engraving.—*a* is the horizontal shaft driven by the steam engine, on which is fixed *b*, a bevil wheel, four feet in diameter, working into *c*, another bevil wheel of the same diameter, which works into four pinions on the spindles of the upper mill stones, two of which are shown at *e e*, each of two feet six inches in diameter; *ff*, spindles of the upper mill stones, having indented pinions, *g g*, near their tops, for the purpose of agitating sieves, which are not shown in the figure; *i i* are the upper mill stones; *k k*, the lower mill stones; *l l*, the hoppers; *m m*, the iron levers on which the spindles of the upper mill stones are planted, and which can be raised or lowered, to adjust the stones, by means of regulating screws, at *n n*; *o o* are screws to raise the pinions, *e e*, and cast them out of gear; *t* is a drum wheel, which works the winnowing machines by means of a strap, not shown. On the shaft, *a*, beyond the limits of our drawing, is placed another drum wheel, which drives, by means of bands and a multiplying wheel, the two blanching machines before described.

For grinding *corrican* and other small grain, the Singalese use a small stone mill *(corrican galle)* consisting of two parts, *a* and *b*, which are put together as in the underneath figure, and the upper one is then turned by the hand, the grain finding its way between the cup and the central pivot. This simple machine, which (as Dr. Davy



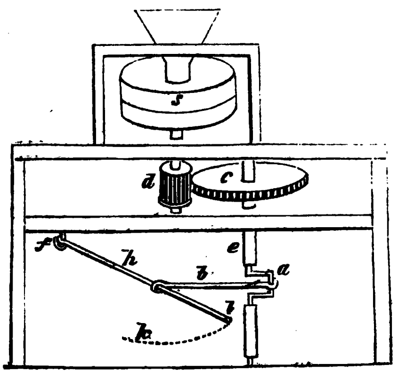
observes) has a near resemblance to the old Celtic quern, is, in fact, on the same *principle* as our modern and most celebrated mills, but it is only adapted for grinding small quantities of grain at a time. We therefore purpose to exhibit separately several very improved mills, in which the same principle is retained, but modified in such a manner as to produce vastly greater effects. In doing this we are compelled to make an arbitrary selection from a great variety of other mills of considerable merit, and such only as strike our judgment to be best calculated to supply the wants of a country like Ceylon, and where the mechanical resources of the natives are of course at present

very much limited. For these reasons we shall now confine our attention to *stone* mills, the construction of *steel* mills being probably a branch of art to which the Singalese are at present not equal to: besides which circumstance it is much questioned by practical men whether steel mills are so well adapted for grinding raw grain as those of stone. Be this as it may, we shall in some of our future numbers take occasion to insert descriptions of the best steel hand mills, from time to time, and shall be ready to insert the communications of manufacturers thereupon.

We shall first describe what we will take leave to call

THE ROWING MILL.

The most advantageous mode of applying human strength is similar to that of the ordinary manner of rowing a boat, wherein a man sits upon a low bench, and with his legs extended before him presses with his feet against an inclined board, whilst he pulls back a lever; because in this action the muscular strength of the individual is greatly assisted in the effort by the weight of his body as he throws it back. In Bockler's *Theatricum Machinarum*, there is a description of a mill, wherein this method of applying manual labour is employed, which will be understood by reference to the annexed engraving and accompanying explanation.



The vertical shaft, *e*, carries a toothed wheel, *c*; upon the crank, *a*, hangs one end of an iron bar, *b*, the other end of which is hung upon the lever, *h*, (which may be considered as the oar or scull of the boatman) one extremity of which is hung upon a fixed hook, *f*, so as to turn freely upon it as a centre of motion. Then, while a man by pulling at the end of the lever, *l*, moves it on to *k*, the bar, *b*, acting upon the crank, *a*, gives it and the wheel, *c*, half a revolution; and the wheel, *c*, simultaneously acting upon the small trundle, *d*, gives that and the upper mill stone, *s*, (which is fixed upon the shaft of the trundle) more than a revolution. A momentum is thus given to the mill stone, which it communicates to *d*, *c*, and *a*, and the lever, *h*, is thus brought back from *k* to *l*. In like manner

another pull at the lever, *h*, causes another rotation, and so on, at pleasure.

In this mill the nearer the end of the bar, *b*, upon the lever, *h*, is to the fixed hook, *f*, the easier will the man work the mill; and by having two or three hooks like that at *f*, fixed at convenient distances, the work of the mill may at any time be adapted to the strength or the weight of the individual, by shifting the lever, *h*, from one hook to another.

If the number of teeth in the wheel, *c*, be six times the number of cogs in the trundle, *d*, then the miller, by making ten pulls at the lever, *h*, in a minute, will give sixty revolutions to the upper mill stone in the same space of time.

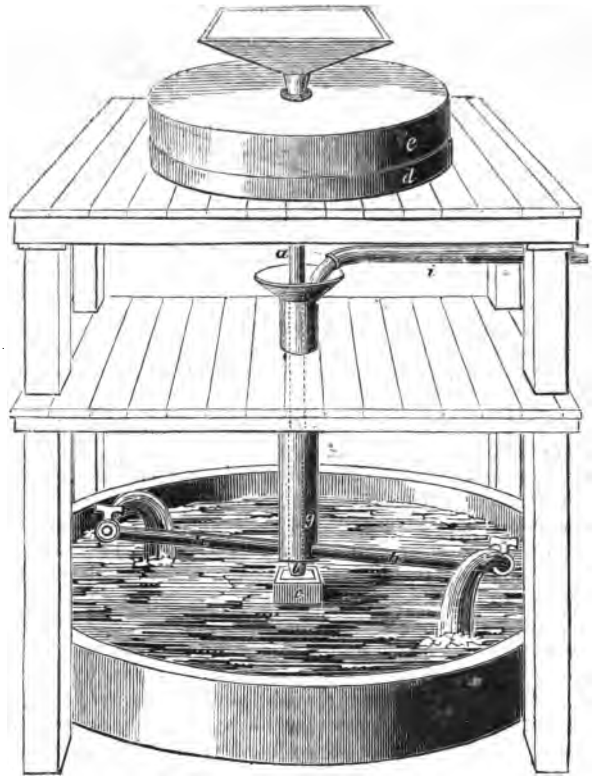
Where a fall of water can be obtained it affords, with the aid of a little art, the cheapest and the most equable power for driving machinery; for this reason we shall now introduce a description of

DR. BARKER'S CENTRIFUGAL MILL,

which was invented by the person whose name it bears, more than a century ago; it is, nevertheless, one of the most simple water mills ever constructed. It has been but rarely introduced in practice, although it has been warmly eulogised and recommended by most writers on the subject of hydraulics. Dr. Desaguliers, who published the first account of it, states that "Sir George Savill had a mill in Lincolnshire to grind corn, which took up so much water to work it, that it sunk his ponds visibly, for which reason he could not have constant work; but now, by Dr. Barker's improvement, the waste water only from Sir George's ponds keeps it constantly to work."—In the mountainous districts of Ceylon, where the water, in descending from one terrace of land to another, is successively employed for the purpose of irrigation, this machine may, during its descent, be most advantageously employed in husking, winnowing, or grinding any kind of grain, or in any other operation in which mechanical power might be useful. Hence we have considered Dr. Barker's Mill deserving a place here, being well assured that any ordinary mechanic in Ceylon is capable of readily making it, and at an expense far less than any other hydraulic power of equal efficacy can be constructed.

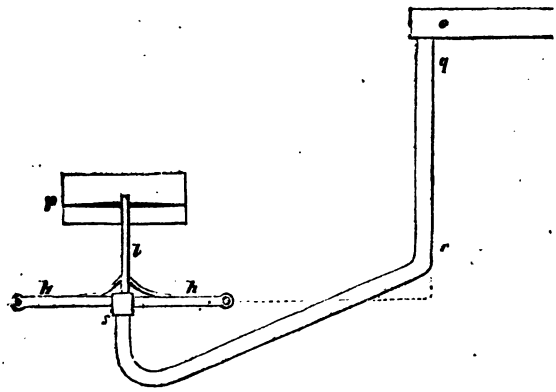
In the annexed drawing which we have made of this invention, it will of course be understood that those parts only which are in shadow are essential to the moving power, and that the incomplete framed building thrown over it has been added by us merely to assist the comprehension of the uninitiated as to the mode of applying the invention.

At *a b* is a vertical axis, moving on a pivot at *b*, which would be best made of steel, and to run in a brass step let into a block of stone as at *c*; this axis passes freely through the lower mill stone, *d*, and is then fixed to the upper stone, *e*. To the axis is also fixed the large vertical tube, *f g*, the upper part of which, *f*, is expanded into the shape of a funnel or basin, for receiving the water from the mill course or pipe, *i*; at the lower part, *g*, this tube has an open communication with the hollow horizontal arms, *h h*, the extremities of



which have each an opening near its extremity on one side, and so adjusted by stop-cocks for regulating the discharge that the vertical tube shall be always kept full of water, in order that the utmost force may be obtained, as a lateral pressure will be produced in all directions in the horizontal arms proportionate to the altitude of the column. Now this pressure being removed from the space forming the area of the aperture in a horizontal arm, by the water being permitted to issue through it, there will be a superabundant pressure on the other side of the arm in which there is no aperture, equal to the force with which the water would spout from the aperture were the machine fixed, and the water permitted to pass through it.

In the preceding form of Barker's Mill, the length of the axis must always exceed in height the elevation of the pipe, *i*, which in some cases might render the erection of such a machine difficult. To remove this difficulty, it was proposed by M. Mathon de la Cour, in Rozier's *Journal de Physique*, for August, 1775, to introduce the water from the mill course into the horizontal arms, *h h*, which are fixed to an upright spindle, *l*, as represented in the annexed diagram,



and without any revolving vertical tube, as in the previously described arrangement.

The water will now obviously issue from the apertures at the extremities of *h h*, in the same manner as if it had been introduced at the top of the tube in the former figure: hence, the spindle may be as short as we please. The practical difficulty which attends this form of the machine is to give the arms, *h h*, a motion round the mouth of the feeding pipe, which enters the arms, without any great friction or any considerable loss of water. In this form of the mill, *o* is the reservoir; *p*, the mill stones; *l*, the vertical axis; *q r s*, the feeding pipe, the mouth of which enters the horizontal arm at *s*.

In a machine of this kind, constructed at Bourg Argental, the tubular arms, *h h*, were each 46 inches long, and their inside diameter 3 inches; each of the orifices 1⅛ inch diameter; the height of the working head was 21 feet above the points of discharge. This, though a great fall, is evidently a very small consumption of water, since it was all supplied by a 2-inch pipe, and when the machine was not loaded, and had but *one* orifice open, it made 115 turns in a minute. Thus a prodigious centrifugal force is produced in the arms and a corresponding velocity, far exceeding that of a simple fall of water, with a pressure of 21 feet head. The machine, when empty, weighed 80 pounds, and it was half supported by the upward pressure of the water.

(To be continued.)

SCIENTIFIC INSTITUTIONS.

London Mechanics' Institution. August 17th.—Mr. Brayley, on concluding his Fourth Lecture on the *Anatomy* of the *Invertebrate Animals*, this evening, informed the members that the small specimens, properly classified and ticketed, as well as the transparencies and diagrams, with which the lecture had been illustrated, would be placed in the Apparatus Rooms, for the inspection of the members, on Tuesday evening, the 21st instant, between 8 and 10 o'clock.

We understand that this excellent practice is always adopted at the Mechanics' Institution, when the illustrations introduced by the lecturers require more minute inspection than can be given during the delivery of the lecture.

An Election for a renewal of a portion of the Committee will take place on the 4th September; and on the 5th of September there will be a Quarterly General Meeting.

We are gratified to learn that the able Professor Millington will shortly commence a course of Lectures on Hydrostatics and Hydraulics.

WESTERN LITERARY AND SCIENTIFIC INSTITUTION.—August 9th, The Lecture Room which has recently been fitted up for this Institution was opened this evening, when HENRY DRUMMOND, ESQ. the PRESIDENT, delivered a short address to a numerous meeting of the members and their friends; which was followed by the first of a Course of Lectures on *Music*, by Mr. Samuel Wesley, to be continued on the succeeding Thursdays.

The President in his address stated, that two years had elapsed since he had first the pleasure of meeting them to form a Literary and Scientific Institution for the use and advantage of the west end of the metropolis. The time since then had been occupied in those preparations which such an undertaking demanded, and it was not till that night that they could truly say their vessel was fairly launched. He felt great pleasure in congratulating them on having realised the object of their most earnest anticipations, that of uniting, under one roof, the means of reading, of study, and of hearing lectures. After bearing testimony to the well-directed and assiduous labours of the committee—noticing the success which attended the exertions of the members generally—the high sanction which they enjoyed in the patronage of a prince, himself so exquisite a judge in literature, and so distinguished a proficient in many of its branches—he concluded by observing, that their having chosen to open with a lecture on harmony was a good omen, and he sincerely hoped that mutual good understanding would never cease to exist amongst them.

LIST OF EXPIRED PATENTS,

Continued from p. 64.

BOBBIN LACE.—To J. Heathcoat, of Loughborough, Leicestershire, for certain improvements on a machine for the making or manufacturing of *bobbin lace*, or lace nearly resembling foreign lace.

BURNING BONES.—To D. Thomas, of Bristol, for a new and improved method for burning animal bones, for the purpose of extracting the fat property and spirituous quality therefrom, and reducing the remaining parts into a substance sufficiently prepared for being ground into ivory black.

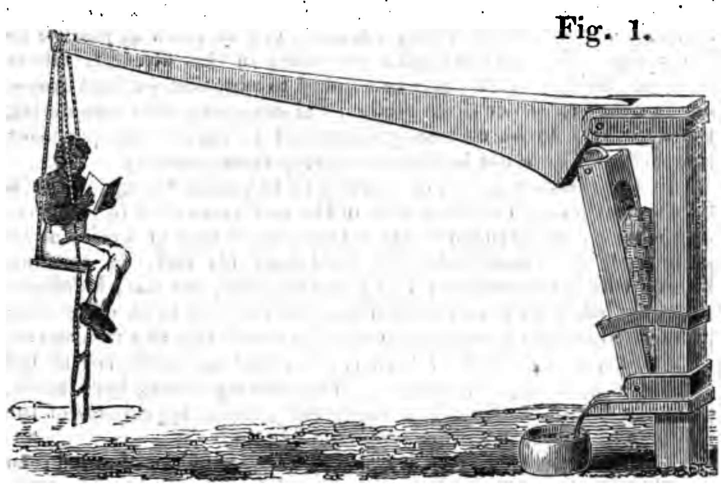
TO OUR READERS AND CORRESPONDENTS.

The puffs of COMMERCE are of so violent a character, that we fear our frail bark might sink under them.

EIGNE's plan is not new; if he looks into the Repertory for June, 1802, he will find his own invention: we sympathize with him in his disappointment.

The improvement proposed by I. O. upon Mr. Green's folding ladder, described in our last, we beg to submit, is none at all:—it would be weaker, and three joints to each step instead of two, would at least double the expence.

Fig. 1.



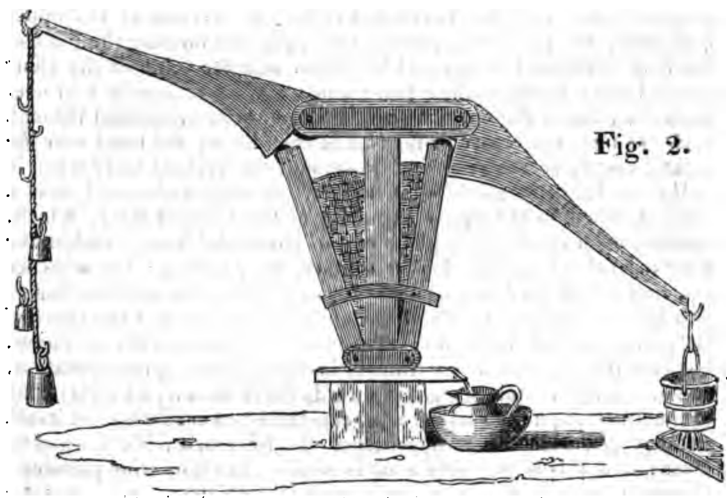


Fig. 2.

HEBERT'S OIL AND WINE PRESSES.

THE simple machines delineated above, were recently contrived by us at the spur of the moment, for the purpose of expressing oil in the island of Ceylon, (see page 112,) but conceiving them upon the little reflection we have been able to bestow upon the matter since, to be of more extensive utility than we had at first contemplated, we present them here to our readers generally, and through them to the public at large.

In sitting down to contrive an oil press, our object was to make *a powerfully effective machine, in which the combinations should be*

few, of the simplest kind, and that should be easily made by the roughest workman at a trifling expence, and as much as possible be self-acting. How far we have succeeded in this attempt, others must determine; but we may be allowed to add, that we have shown our sketches to two or three professional engineers, who considering the apparatus to be eminently calculated to answer the purposes intended, we have not hesitated in giving them publicity.

In the sketch Fig. 1, our object was to exhibit the apparatus in its simplest form; the black man in the seat suspended to the horizontal lever, is intended to show that a great deal of work can be performed by a man, who can be taking his rest, or amusing himself with other matters; this being obviously the fact, it follows (however ludicrous it may sound) that the business of an oil or wine presser, might be advantageously combined with that of a shoemaker, or a tailor, as the work of both crafts might be conducted at the same time by a single individual. The drawing having been made, as applicable to the Singalese bags, the peculiar appearance of the contents of the press will be accounted for.

The whole machine consists simply of three pieces of wood; an upright piece is fixed firmly in the ground (a tree would answer the purpose well), near the lower end of which, and also at the upper extremity, are projecting pieces, the upper one forming the joint of the long horizontal lever, and the lower one the joint of the short vertical one; to strengthen these joints a strap of iron is laid over them, and round the upright post, and iron bolts are passed through each, to form the centre or fulcrum to each lever; the band near the middle merely serves as a stay, to support the vertical lever when it is thrown back, as exhibited in Fig. 2. It will be observed, that a roller is fixed to the upper extremity of the vertical lever, which, running upon the inclined plane of the horizontal lever, renders the friction of these parts, when in contact, very trifling: but what we consider as the most important result of this peculiar combination of two levers (which are both of the second class) is, that the effect of the power applied, is but little at the commencement of the operation, but that the pressure is continually increasing during the operation, and becoming prodigiously great towards the close of it; which is owing to the pressure on the vertical lever constantly accumulating (of itself, without attention) as it approaches the fulcrum of the horizontal lever: now this is precisely what is wanting in oil or wine pressing: if a great pressure be given at the first, the bags are burst, and the liquid is lost.

Fig. 2. shews an extension of the same principle to forming a double press. By this arrangement double the effect is produced, at about half the additional cost of one press; and if both presses were worked together (which might always be the case), instead of the central post being fixed in the ground, it might be put on a moveable stand, as the weight or force of one press would counterbalance that of the other. This figure likewise shews two convenient modes of working the press with very little attention: to one of the horizontal levers a rope is suspended, having hooks at convenient distances,

upon which such weights may be hung as may be found necessary to give the required pressure; to the other is suspended a bucket (the capacity of which would be regulated by the circumstances), to take advantage of a descending current of water, (if the locality admits of it,) or of a reservoir, or supply pipe that might be raised to a proper elevation for filling it; when the operation is completed, as represented on one side of the press, the bucket, falling against a tail piece fixed upright in a channel or gutter, opens a valve, lets all the water out of the bucket, and relieves the press from the force of its weight. Thus, in a situation where water is plentiful, a number of large presses (charged with the necessary materials for obtaining oil or wine juice), might be filled over night; the next morning the buckets would be found discharged of their water, and the previously empty recipients for the oil or wine juice be found filled, without any attendance whatever.

It is perhaps deserving of notice, that the self-acting property of these presses admirably adapts them for situations where advantage could be taken of the ebbing and flowing of the tide: the rising of the water would thus fill the buckets, and upon its falling, leave them suspended with their loads to do the work of the press; the return of the tide would take off the pressure, for the renewal of it upon its descent, and thus every twelve hours the presses might be worked with almost unlimited power, and without any attendance to the moving force.

We need not tell our mechanical readers, that presses of the kind we have here submitted to their consideration, may be variously modified and altered in the proportions and forms of their parts; in some situations the vertical lever might be lengthened, and the horizontal one shortened, or *vice versa*, to suit convenience and the power required; and an increased pressure might be given to the material in these presses, merely by reducing the extent of the surface pressed upon, or by placing the material nearer to the fulcrum. Though not so compact, these presses have many advantages over screw presses, they cost less, they are easier worked and with greater celerity.*

The presses in their present form are suited for the expression of oil from most vegetable and animal substances. For expressing the juice from grapes, currants, gooseberries, mulberries, elderberries, lemons, oranges, the pulp of apples, pears, &c. their application is equally obvious. Under certain modifications the gradually increasing power of these presses would be found an improved substitute for the ordinary cheese presses. By altering the position of the press we perceive it may be readily adapted to various other purposes besides the above mentioned: and whether upright, inclined, or horizontal, the practical man will not fail to see that it is easily converted to a most effective machine for cutting and punching bars of iron, the pressing of sheet metal into various forms, &c. &c. &c.

* Since writing the foregoing account we have had some conversation on the subject with Messrs. Don & Smith, Engineers and Builders, of N°. 65, White Lion Street, Islington, who are so much pleased with the presses, that they have undertaken their manufacture to suit a variety of purposes.

NEW PATENT MODE OF TANNING,

By T. J. Knowlys, Esq., of Oxford, and Mr. W. Duesbury, of Ronsal, Derbyshire.—*Enrolled February*, 1827.

The practice of tanning leather (with some unimportant and temporary deviations), has been nearly the same from time immemorial. The process of saturating a skin with the vegetable principle is so extremely slow, that it has naturally of late years occupied much of the attention of the chymist, as well as of the manufacturer; with the view of shortening the operation. Some amelioration as regards the time occupied in performing it was introduced by the ingenious Seguin, but the leather formed on the principles of his process is said to be neither so soft, nor so durable as that produced by the former mode. Very recently, (about two years ago), two patents were taken out for tanning by means of mechanical pressure, one of which, Spilsbury's patent, (the most scientific of the two), is described in No. 61, vol. iii. of the Register of Arts and Sciences: whether this process has answered in practice on the large scale we have not heard; but another method has been recently patented by the above-mentioned persons, which seems to be better calculated to effect the end proposed.

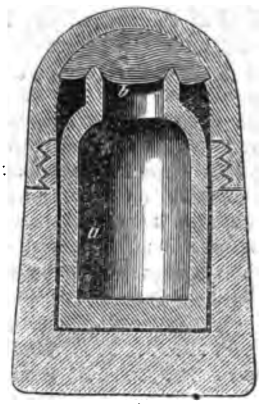
By the present patent it is proposed to suspend the skins vertically in a large air-tight vat, and exhaust the vat as well as the skins entirely of air, previous to saturating them with the tan liquor, which the skins will in consequence more readily imbibe.

A large aperture or man-hole is made at the top of the vat, for a workman to descend and hang up the skins, which are stretched from side to side upon hooks, at a regular distance apart, and kept in vertical and parallel positions by leaden weights at their lower edges. This being done, a *weak* infusion of tan is admitted until it covers the hides; the workman then closes the man-hole by the cover, which is rendered air-tight by a proper packing upon its rebated edges; the air is next exhausted by the air-pump as far as may be deemed necessary; in this state the vessel is to remain for a day or two, when the air may be re-admitted in by a stop cock, and the liquor pumped out through a pipe at the bottom of the vessel. The hides are then to remain to drain, and in contact with the air for a few hours, after which, a second infusion of tan, *stronger* than that first used is let in to cover the hides, and the process repeated as often as may be found necessary to completely tan the hides, *increasing the strength* of the liquors at every successive operation.

PATENT STOPPED BOTTLES.

By Mr. Henry Berry, of Abchurch Lane, London.—*Enrolled June*, 1826.

This invention consists in employing the elastic resin, caoutchouc, or Indian rubber, in forming the stoppers of bottles, with the view of preventing the escape of volatile and other fluids, which cannot be well retained by the usual means of stopping. To effect this



object, several methods are described by the patentee in his specification, and that which is delineated above, represents the section of an ink bottle for the pocket. *a* is the glass bottle, with the extremity of the neck ground to an angular edge, where it is brought into contact with a disc or button of caoutchouc *b*, fixed into the top of the exterior case, which is of hard wood: the top being screwed down as shown in the figure, the glass edges of the bottle are pressed into the elastic substance, so as to form a close and perfectly air-tight stopper. For volatile salts the patentee uses the ordinary glass stoppers, and applies a collar of caoutchouc under a projecting flange of the stopper, which presses upon the upper surface of the neck. In ink stands for the table, a button of caoutchouc is fixed upon the lid, which when shut down closes the orifice of the bottle. It is needless to describe any other modifications of this invention, some of which have, we know, been applied by Mr. Thomas Hancock long ago. But we ought not to dismiss this subject, without noticing the error which the patentee appears to have made, in supposing that his caoutchouc stoppers will effectually confine all kinds of volatile fluids, as in fact the greater part of them will dissolve caoutchouc; and it should be borne in mind, that long continued pressure upon caoutchouc, will leave a permanent dent in the part, which will in a great measure destroy the effect intended by the patentee.

ON THE VALUATION OF SPIRITUOUS LIQUORS:

By Mr. Wm. Gutteridge.

(*Continued from p.* 88.)

I had been so long impressed with this necessity,* that I had the Tables then ready, and instantly put them to press; but as they cannot fail to excite inquiry, seeing that a most important branch of trade will be affected by them, and, as it is due to those who pur-

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* Of a new set of tables—see our last, page 88.

chase them, to be assured of their accuracy, I would *first* state that they are in perfect unison with *Mr. Gilpin's* aforesaid computations; and, *secondly*, I would prove his, as well as my own, to be correct. In doing this I will prove the last set of Tables before alluded to, to have been also as correct as it is possible they could be made from the means employed. Those means could have been no other than an absolute standard imperial measure, and a well-adjusted hydrometer; it being evident, on examining 100 gallons of each strength, that the weights do not result from specific gravity within the limits of any gravimeter of not less than ten times the precision of the hydrometer. The six legal strengths weigh by those Tables, as follows: for 100 gallons of each—

	Cwt.	Qrs.	Lbs.	Oz.	Drs.
25 per cent. O. P.	7	3	17	11	13
11 do. do.	8	0	9	0	10
Proof	8	0	23	1	7
10 per cent. U. P.	8	1	6	15	6
17 do. do.	8	1	14	10	4
22 do. do.	8	1	19	12	5

We discover the heat to be 62°, at which these weights agree very nearly to the measure.

Now *Mr. Gilpin* proves that the bulk of alcohol, if heated to 60° contained in a spirit of ·9236 specific gravity (which is that of proof, at 51°) is ·6192. From the same we can discover that proof at 62° contains ·6161 of alcohol at 60° of its bulk at 62°: and if we multiply this ·6161 by 1·11, *i. e.* 11 per cent. over proof, we get ·6839, which by *Mr. Gilpin* is the alcohol contained in a spirit whose specific gravity is ·9050, one hundred gallons of which weighs 8 cwt. and 9 lbs.—only 10 drams different on the hundred gallons from that given above; and if only ·0001 of specific gravity more were added, the error would be more considerable on the contrary side.

This proves the accuracy of the Tables in question as well as my own, and their perfect agreement with *Sir Charles Blagden's data* and *Mr. Gilpin's* computations; and also, that if the Tables in question had been constructed from specific gravity that it was greater than ·9050 and less than ·9051; and as the gravimeter, only giving four figures of specific gravity, is four times as minute in the fourth place as the hydrometer, it follows that one giving to five places must (as before observed) be more than ten times that precision—a thing both unnecessary and practically inconvenient. Whatever trifling differences may, therefore, be discoverable between Tables constructed from specific gravity as mine are, and those from the hydrometer and standard, are never of the slightest consequence in practice; and are always owing to the utter impossibility of the hydrometer approximating nearer; the greater precision being always in favour of the Tables from specific gravity.

At a future period I propose to submit something further connected with this important subject.

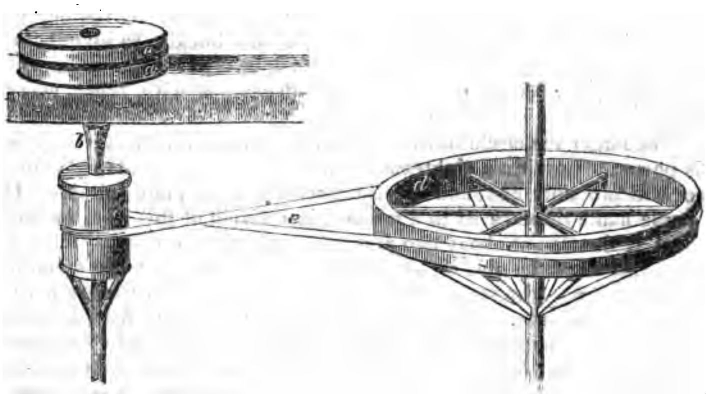
1, Castle Court, Budge Row, London.

STATE OF THE ARTS IN FOREIGN COUNTRIES.

CEYLON.—N°. III.

[Continued from p. 95.]

The only form of mill which we propose to notice in this place, in addition to the foregoing, is one described in the Franklin Journal for July, 1826; it is the subject of a communication to that ably-edited and very useful work, and is addressed to the Farmers and Planters of the United States; we give insertion to the whole of it verbatim, as the remarks made by the writer upon the inconvenience sustained by the American farmers by the want of grist mills, must equally apply to those in Ceylon; it being obvious, likewise, that the power of the horse or the ox of America may be easily substituted by that of the buffalo of Ceylon.



ECONOMICAL HORSE MILL, FOR GRINDING GRAIN.

A large portion of the farmers, and others, living in all parts of the United States, have, from the earliest period of its settlement, to the present day, suffered much inconvenience, and had their comfort and prosperity greatly abridged, in consequence of the great distance of their dwellings from grist mills; and the frequent summer droughts of late years, have caused the evil to be more extensively felt.

Good mills are now very general, yet thousands of us are settled at such a distance from them, or see those in our neighbourhood useless from want of water, during a large portion of the year; that the labour of carrying grain to the mill, is frequently greater than would be necessary to grind it, were a mill constructed, that could be worked with facility by a horse, or an ox. In such a mill the very animal which is now employed to carry the grain, and wait for and return with the flour, might sometimes grind ten times the quantity in the time which is necessarily lost.

Various plans for making cheap and simple mills, have been proposed, but from their not getting into general use, it is to be presumed

that they have not been found to answer the purpose. The writer feels confident that the objections which have existed to those which have been heretofore erected, will be completely obviated by the plan which he is about to propose. He is aware that economy is a point of the first importance: the mill which is here described, will cost much less than those which have been heretofore erected for a similar purpose; its construction is very simple, and the common country carpenter and smith will find no difficulty in completing it.

The plan, it is believed, is new, and that it is effectual has been fully ascertained, as the writer has a mill of the description now at work. The subjoined sketch will give a sufficient idea of those parts which it is necessary to describe.

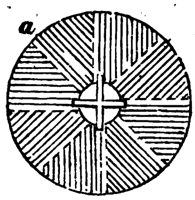
a a are the mill stones; *b* the spindle which supports the upper stone; *c* a drum upon the spindle, made long to prevent the belt from running off; *d* a large gin, with its shaft and arms; (the lever to which the horse is to be yoked is not represented); *e* the belt of tanned leather, five or six inches broad, with a buckle, to give it the necessary tightness. It has not been thought requisite to represent the hopper, and other necessary appendages, as with these every country mechanic is sufficiently acquainted.

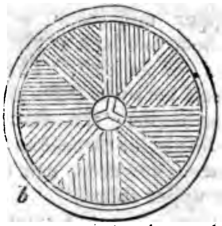
The larger the circle in which an animal draws the greater will be his power. Less than eighteen feet will not answer, but twenty-four feet will probably be found in most instances to be more suitable. If a horse make three turns in a minute, in a circle of this size, he will travel at the rate of about two and a half miles in an hour. Then if the diameter of the gin, or large drum, be to that upon the spindle, as forty to one, the stone will make one hundred and twenty revolutions in a minute. In this case the gin may be thirty feet, and the small drum, nine inches in diameter; but it will probably be better to allow one foot for the drum, which will give to the stone ninety revolutions, the track of the horse remaining as before; it is evident, however, that if this track is made smaller, the horse, travelling at the same rate, will give greater velocity to the stone.

There are several advantages in making the belt wide, as it takes a firmer hold, is less subject to stretch, and less apt to slip off.

In different diameters of the stones, and other changes, the whole must of course be so modified as to suit them, but this can be done by any man of common understanding. It will always be best to place the whole under cover, not only to preserve the wood work, but to enable the farmer to work in wet weather; the belt, if wet, would stretch, and not turn the stones. It will probably be found best, in most cases, to place the stones, hopper, &c. in the corner of a barn, or other suitable building, with the gin on the outside, and the strap passing through holes made for the purpose. S.

Before closing this part of our subject it may not be amiss to notice, that in order to cut and grind the corn, both the upper and under mill stones have channels or furrows cut in them, proceeding obliquely from the centre to the circumference, as shown in the annexed engravings.



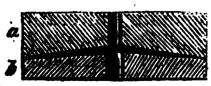


These furrows are cut perpendicularly on one side, and obliquely on the other, into the stone, which gives each furrow a sharp edge, and in the two stones they come, as it were, against one another like the edges of a pair of scissors, and so cut the corn, to make it grind the easier when it falls upon the places between the furrows. These are cut the same way in both stones when they lie on their backs (as above represented) which makes them run cross-ways to each other when the upper stone *a* is inverted, by turning its furrowed surface toward that of the lower one *b*. For if the furrows of both stones lay the same way, a great deal of the corn would be driven onward in the lower furrows, and so come out from between the stones without being cut or bruised.

When the furrows become blunt and shallow by wearing, the running stone must be taken up, and both stones new dressed with a chisel; and every time the stone is taken up there must be some tallow put round the spindle upon the bush, which will soon be melted by the heat the spindle acquires from its turning and rubbing against the bush, and so will get in between them, otherwise the bush would take fire in a little time.

The bush must embrace the spindle quite close to prevent any shake in the motion, and whenever this occurs the adjustment must be restored by a judicious and careful driving of wedges between them.*

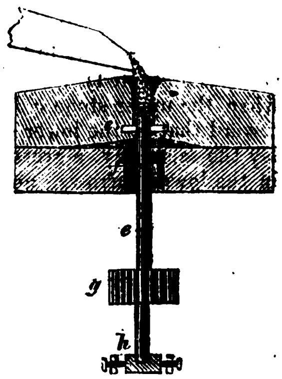
The grinding surface of the under mill-stone is a little convex from the edge to the centre, as exhibited in the annexed section at *b*, and that of the upper stone a little more concave: so that they are farthest from one another in the middle, and come gradually nearer towards the edges. By this means, the corn at its first entrance between the stones is only bruised; but as it goes farther on towards the circumference or edge, it is cut smaller and smaller; but at last finely ground just before it comes out from between them.



* In these operations it would be highly desirable that some of the natives should be personally instructed by a European millwright; they might thus soon acquire sufficient practical knowledge to serve *their* purposes effectually, which would be a lasting benefit to Ceylon. All the information that we can give on these points must necessarily be very limited, as it would require a large volume to give practical instructions in every particular. What we do give, however, we have no sort of doubt may be turned to a useful account by some of the ingenious native artisans.

The upper mill-stone, *when six feet in diameter*, is generally hollowed about one inch at the centre; and the under one rises about three-fourths of an inch. The corn that falls from the hopper insinuates itself between them as far as two-thirds of the radius where the grinding begins; the distance between the stones being there about two-thirds, or three-fourths of the thickness of a grain of corn. This distance, however, can be altered at pleasure by raising or sinking the upper stone.

The concavity in the upper stone, shown in the preceding diagram, is that described by Mr. John Nicholson, and other eminent authors; but we have reason to believe that the upper stone is not usually cut away to a greater extent beyond the mill eye than that described in the figure in the margin:



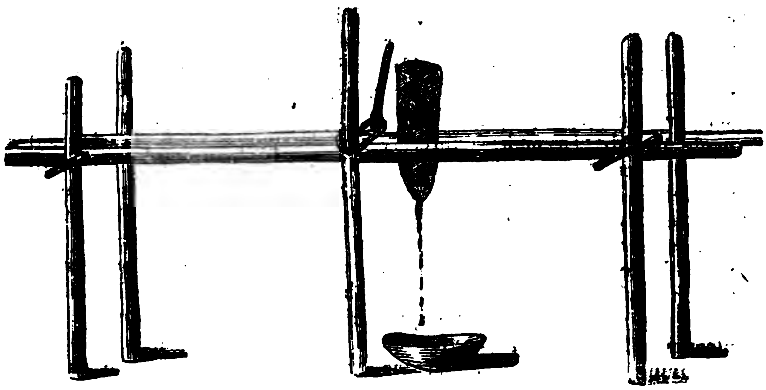
where the grain is shown entering the mill eye and passing through the apertures of the ring *c*, it enters the cavity underneath; here it gradually gets broken, bruised, or coarsely ground, and from hence the finest portion enters between the *parallel* surfaces of the mill stones, and by degrees passes from between them at their peripheries, being constantly urged outwards by the pressure of the grain in the middle, as well as by the centrifugal force. The ring *c* is fixed to the spindle *e*, and the cavity *f* in the lower stone is filled in completely with the bush, through which the spindle revolves. The trundle *g* (driven by a cog-wheel, which is actuated by a first mover) gives motion to the spindle and the upper stone.

The surface of the upper stone is brought to a true parallel position with respect to the other by means of four equidistant regulating screws, acting upon a brass box *h*, in which the lower extremity of the spindle works; so that the slightest movement of the box effected by the screws, makes a corresponding alteration in the position of the upper stone, enabling it to be adjusted to the lower one with the nicest precision, and with the greatest facility.

We purpose here dismissing the subject of the construction of corn mills; it appearing to us that more minute details would be unnecessary in the present state of the arts in Ceylon, but when we come to treat of the mechanical operations of the Hindoos, (which are considerably advanced beyond those of the Singalese,) we shall describe a variety of other mills as improvements upon their arrangements for similar purposes: and we shall take care to connect the separate matter upon one subject, though relating to different countries, by a regular succession of references, so that the detached papers may be easily read as one continued treatise.

OIL PRESSES.

Next to the culture and the preparation of rice and other kinds of grain, the obtaining of oil from the cocoa nut (with which Ceylon abounds) and various kinds of seeds, appears to be the most deserving of attention. With the nature of the means resorted to by the Singalese for obtaining that valuable commodity, we suspect our information is rather defective; for it can hardly be supposed that a contrivance, so ill-adapted for the expressing of oil, can obtain general usage, as the domestic machine which Dr. Davy describes as being used for that purpose. It consists merely of a few upright poles stuck in the ground, supporting two parallel horizontal bars between them; between these a bag containing the seeds is put, in the manner represented by the subjoined sketch, and pressure is given to the bag, by means of a perpendicular lever, which forces the horizontal bars towards one another.



Whatever may be the vegetable matter subjected to mechanical pressure for obtaining its oil, it should if not naturally of a soft state, be either bruised or *ground to a pulp*; the latter state, or that in which the substance is the most minutely divided, has unquestionably the preference, as the oil may in consequence be more easily extricated. The pestle and mortar, which is universally employed by the Singalese, is one obvious means of producing this effect, but its operation is slow. For this purpose we do not know of any other means so potent as that of a pair of common edge stones. The construction and operation of these is well understood by our readers at home, and our friends abroad may find sufficient information in our 23rd number, vol. i., where a mill of this kind is delineated and described, for the purpose of grinding the materials used in making gunpowder, which is obviously as well-adapted for bruising seeds. But as economy in the labour, and in the expense of constructing a machine for this purpose, is a consideration of moment, we would here suggest, in lieu of the edge stone mill, the employment of a very

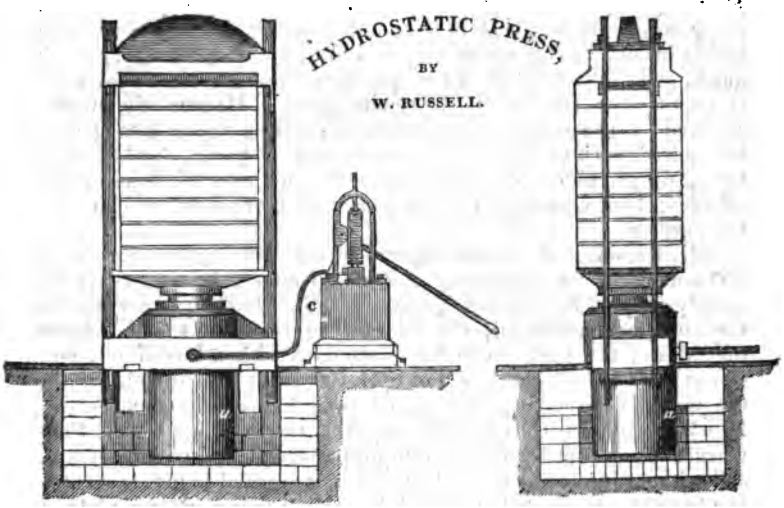
effective apparatus, that may be easily constructed by any individual having the slightest mechanical tact, and that will be of trifling expense; we allude to the machine for reducing potatoes to a pulp described in our 18th number, vol. i. first series, with engravings. This machine would reduce cocoa nuts to exactly the state suited for pressing out the oil, while it would serve equally the purpose of the farmer in obtaining the flour or starch from the potatoe, the arrow-root, and other farinaceous vegetables, thus enabling them easily to preserve a store of the purest and most nutritious kind of food, that will keep for years (we might almost say centuries); and obtained, too, from vegetables which cannot be otherwise kept from decomposition but for a very short time.

The kernel of the cocoa nuts being reduced to a pulpy state by any means, the next business is to express the oil; and the most powerful apparatus for this purpose, is unquestionably the hydrostatic press invented by the late Mr. Bramah, which, while it serves as a grand illustration of the well known philosophical fact, of the equality of the pressure of fluids on equal areas and in all directions, however unequal their bulk or cubical admeasurement, is at the same time, a beautiful and ingenious application of the principle to the most useful purposes. A press of this kind was sent out to Ceylon by government, in the year 1814, which was made by Mr. Bramah, expressly for the purpose of pressing oil from the pulp of the cocoa nut kernel; a very full description of all the details of which, is given in the 34th volume of Transactions of the Society of Arts, under the head, *Mr. T. Hoblyn's** Oil Press. It was our intention to have given in this place a copy of that valuable document, but the want of sufficient space, and time to get the engravings properly executed, obliges us to defer the introduction to a more convenient opportunity. We have, however, the pleasure of presenting to our readers for their present inspection, an engraving of a similar apparatus, which has been lent to us by Mr. Russell, engineer, of St. John Street, who has had great experience in the manufacture of hydrostatic presses, and who was individually engaged, when in the service of the late Mr. Bramah, in making the identical oil press before mentioned, which was sent out to Ceylon.

In the annexed figures it will be observed, that paper, cloth, or some such similarly-packed material, is shewn as in the press, but our business being at present with the expression of oil, the reader must suppose the press to be filled with bags of cocoa nut pulp, in lieu of that which is exhibited. The frame work and all the parts of an hydrostatic press, are made of metal of great strength and solidity. *a* is a cylinder of cast iron, of great thickness, bored perfectly true, and having a solid piston *b*, or plunger of metal,

* This mistake has no doubt arisen, from the circumstance of Mr. Hoblyn having been the active and zealous agent of the government, in superintending the execution of its orders, and in getting the work so ably done by Mr. Bramah, and in communicating the result to the Society of Arts.

Front Elevation. *Side Elevation.*



which fits accurately the bore of the upper part of the cylinder, but leaves in the lower part a narrow space between them; into this narrow space the water is injected by the force pump *c*, and as water is nearly incompressible, the piston (however great the load upon it) is necessarily lifted up at every stroke of the pump, to a height proportioned to the difference of the area of the piston of the cylinder *a*, to that of the forcing pump *c*, on the principle before mentioned, that the pressure of fluids on different surfaces is in the proportion of their areas, without regard to their forms. The powerful effect of these presses may be easily calculated, by the example delineated in the preceding figure: the piston of the pump is 1 inch in diameter, and the piston of the cylinder 10 inches diameter, or 100 inches area; consequently the pressure of 1 inch balances the pressure of 100 inches, when the machine is at rest; now, if to the end of the lever of the pump, which has the power of twenty to one, be added by manual labour a force equal to 3 cwt., that 3 cwt. produces a pressure upon the piston of the pump equal to 3 tons, and this pressure of 3 tons being exerted upon every inch of the area of the large cylinder, gives to the piston moving therein a force of 300 *tons*, which is communicated to the goods placed above. Now this is the constant effect in practice of an ordinary hydrostatic press; but the piston of the pump may be easily constructed of only a quarter of an inch diameter, instead of an inch; the power would thereby be increased sixteen times, *i. e.* raised to 4800 tons! It is equally obvious, that the power of a machine on this principle may be increased *ad infinitum*, either by increasing the difference in the proportions of the essential parts, or by applying greater weight to the lever of the forcing pump.

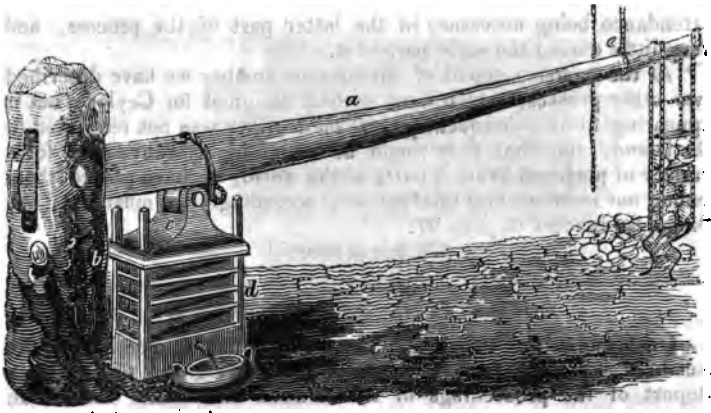
For the purpose of accelerating the first part of the operation of pressing, when the resistance to its action is but trifling, a second pump is sometimes added of larger dimensions, usually about two inches diameter; this pump is worked first, for bringing up the work quick, and the latter part of the operation, in which the utmost force is required, is effected by the smaller pump. Hydrostatic presses are used for almost every description of pressing where great power is required, such as linseed, spermaceti, sugar, paper, books, tinctures, drugs, hides, &c. and where the first cost of them can be afforded, their economy in use is greater than any other machine for the purpose.

Mr. Russell is at present engaged in constructing two presses of 300 tons each, for expressing castor oil from the beans, which are equally adapted for expressing cocoa nut oil. In the presses sent to Ceylon before mentioned, the oil exuding from the bags ran down the sides of the jambs, which was attended with a loss of oil, and was at least an inelegant mode of operating; but Mr. Russell has, in the presses now making, introduced some improved arrangements, by which the oil is conveyed directly from the bags into a tray, from whence it runs out by a spout into proper recipients, without waste, and without inconvenience. Each press is adapted to press seventy-five bags at a time; between each layer of which a strong plate of tinned sheet iron is interposed, to prevent any discolouration of the oil; the presses are worked by one pair of pumps, having a pair of stop valves, to open a communication with one or both presses at a time.

Although the hydrostatic press is the most economical power that the manufacturing *capitalist* can employ, the first cost of it is beyond the ability, and its potency greater than is required by the small manufacturers, and by the farmers generally of Ceylon, to whom, however, a press of some kind is indispensable. Screw presses from Europe and India have, we understood, been introduced into the island,* but the expence of them being considerable, and requiring much labour to work them, the miserable substitute described by Dr. Davy is, we presume, the common machine made use of for the expression of oil. Considering this to be the state of things, we have endeavoured to contrive something for the purpose, which should be simple, cheap, easily made, self-acting, of great power, and adapted to the country where there is no want of timber to make, or of space to work it in.

The power of the lever in its simplest form, whether of the first or second class, is well known to be almost illimitable; more compact machines are made for convenience merely, there can be none of greater power. In the annexed sketch is shown an apparatus, which cannot we think be well exceeded in strength, facility of construction, and effectiveness. A stump of a tree *b*, is evidently better than any post, where it can be conveniently made use of: all that is to be done is to cut a hole through it, or saw out a mortice

* An improved patent-screw press, by Dunn, is described in our 96th No. vol. iv., 1st series,—another by Pouchee, in N°. 4, present series.



from the top, and fix therein the end of a stout pole *a*, by means of a strong bolt passing through both; the other end of the lever may be raised at pleasure by a rope *e*, passing over the branch of a tree above, or for want of that, a slight pole may be stuck in the ground perpendicularly, and the rope be passed over a pulley, or through a smooth hole at the top, with a counterbalance weight at the end of the rope. As near as it is possible to the stump of the tree, the frame containing the bags, &c. should be placed, upon ground made previously firm and level; a platform had better be laid next to the soil, composed of a few loose boards; on this lay the tin or iron case for holding the oil; inside the case place the four upright guide bars shown in the figure, which should be connected together at bottom by a cross framing; on this lay the bed, which should be made of a strong plank, three or four inches thick; on the bed make a layer of bags, (containing the material to be pressed,) and as many as will cover it, leaving a little space between each bag If the bags are of the ordinary conical form, two must be laid one over another, (the large end of one over the small end of the other,) to bring them to a level bearing; a press board is then to be laid over them; then another layer of bags; and then another press board, and so on, until the frame is filled to the top. The head of the press *c*, which is supposed to have been suspended to the sling above, by means of the projecting axis of the anti-friction roller under the lever, may now be let down, and having placed a vessel under the spout for the reception of the oil, the machine is ready to work. From the length of the leverage, it is probable no power will be requisite at the beginning of the operation, the pressure should at first be very gradual, to prevent the bags being burst; in proportion as the oil exudes, the fibrous portion of the materials under pressure, becomes more and more compact, rendering greater pressure necessary, which it is then able to support. A heap of stones may be collected at the end of the lever as shown, with which the suspended rope netting may be supplied, so as to produce any required pressure, loading the higher compartments from time to time, as the operation proceeds; which may be completed during the hours of rest, no

attendance being necessary in the latter part of the process, and very little during the early part of it.

At the commencement of the present number we have described two other presses, which were at first designed for Ceylon, but it appearing to us subsequently that their utility was not restricted to the island, and that they would be found highly convenient for a variety of purposes in most parts of the world, we have placed them among our more general intelligence; accordingly we must refer our Singalese readers to page 97.

(To be continued.)

SCIENTIFIC INSTITUTIONS.

On Wednesday, the 5th September, a general meeting of the members was held for the purpose of receiving the Committee's Report of the proceedings of the London Mechanics' Institution during the past quarter. Dr. Birkbeck, who presided on the occasion, stated the objects of the meeting.

From the Committee's Report it appears, that the finances are improving, notwithstanding a small diminution in the number of the members since their last meeting three months ago, the present number being 1067. This diminution was stated to be an usual occurrence during the summer quarter.—Two gentlemen (T. W. Goodwyn, Esq. and John Melville, Esq.) were admitted honorary members for having given ten guineas each to the Institution; and one (E. W. Brayley, Jun. Esq.) for having given a course of six lectures: and to the library have been added about 150 volumes received in presents from members and others during the quarter. To the Museum have been presented a variety of mineral specimens by various members; and the skeleton of an adult male, by Mr. W. Coulson, the anatomist. The Report then stated that several additions had been made to the school department, particularly to the classes for instruction in mechanical and architectural drawing.—The courses of lectures which have been delivered during the quarter, and which we have regularly noticed, were then enumerated, and it was stated that the president would, at an early period, resume and complete his course on the anatomy and physiology of the human body; that Professor Millington would commence on the 14th September, a course on *Hydrostatics and Hydraulics*; and that Mr. Downes would deliver two lectures on the *Application of Magnetism to Navigation, and on the means of determining the Longitude of Places*, on the 12th and 19th of this month.

N. B. Since writing the above we have been informed, that Mr. Downes's first lecture will be deferred till Wednesday the 19th, and Professor Millington's first lecture till Friday the 21st of September; and that no lectures will be delivered at this Institution before that time.

We have heard of no proceedings of public interest at any of the other Institutions, since our last notice of them.

The List of Patents will be given in our next.

Fig. 1.

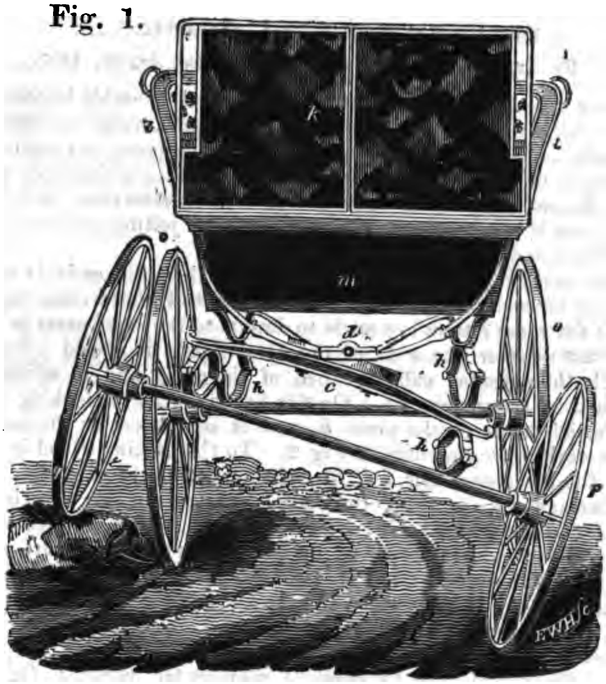
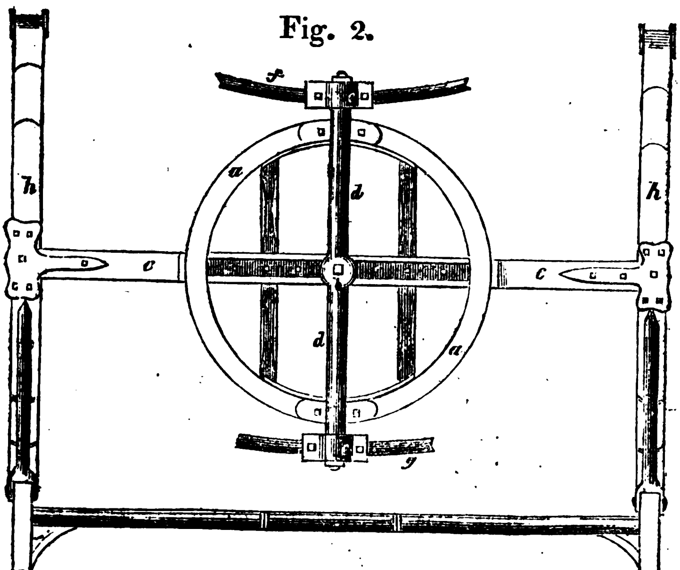


Fig. 2.



FULLER'S PATENT CARRIAGE.

PATENT IMPROVED CARRIAGES,

By Thomas Fuller, of Bath.—*Enrolled August*, 1827.

The subject of the present patent is of considerable importance, as it concerns the safety, ease, and comfort of persons travelling in four-wheeled carriages: which the patentee proposes to construct so as to prevent their upsetting by those irregularities in the road, which are sufficient to overturn those of the usual construction; and at the same time lessen considerably their unpleasant jolting motion, arising from the same cause.

The method proposed for effecting these desirable ends, is simple and will be easily understood by reference to the preceding figures, where the same letters are made to designate the same parts in both. Immediately over the axle of the fore wheels is placed a bar *c c*, (which the patentee calls the bed of the axle) and to which it is attached by the springs *h h*. On this bar is placed the locking wheel *a a*, which turns on the pivot *b*, and is supported on the bar and frame work, as represented in Fig. 2. To the locking wheel is firmly fixed the horizontal bar *d d*, at right angles to the axle bed, when the carriage is going straightforward. The ends of this cross bar are turned and fitted into the plummer blocks *e e*, which are attached by means of the connecting pieces *f f* and *g g*, to the fore part of the carriage, as represented in Fig. 1. This permits the axle of the fore wheels with the locking wheel to take an inclined position while the body of the carriage remains level, and in this the improvement consists.

It will be seen from the carriage represented in Fig. 1, (which is a front view) that the axle of the fore wheels *p q*, with the locking wheel and its attachments, is inclined considerably by the wheel *q* passing over an elevation in the road, while the body of the carriage remains horizontal, and its weight is equally supported by both the wheels, instead of being all thrown on the lower wheel, as would be the case were it not permitted to turn on the pivots of the bar *d*.—The patentee states that he has not applied this to the hind wheels, as the danger of upsetting, or the unpleasant jolting motion, does not so much depend upon them as upon the fore wheels.

The other parts of the carriage are not different from those in common use, and therefore need not be particularly described. *o o* are the hind wheels, *l l* part of the seats, *k* the dashing iron and leather and *m* the foot board.

The advantages of this invention must be so obvious to every reader as to require no further remarks on our part.

FRENCH STEAM ARTILLERY.

Important Experiments on Steam, Heat, &c.

In the Franklin Journal for June, 1827, (just received) Dr. Jones has inserted a letter from Mr. Perkins, on his new High-Pressure Engine, and various other subjects connected therewith: the following

extracts which we make from it being, we presume, of the highest interest, not only to our *scientific* readers, but to the world at large, we make no apology for their present introduction in the place of accounts of some new patented inventions, which we had prepared for insertion. The letter is dated London, 8th March, 1827.

I am now engaged in building steam artillery, as well as musketry, for the French government. The English government would certainly have adopted this invention, had it not been for the gratuitous and false statements of certain engineers, who declared, that though I was able to make a great display at the public exhibition, made by order of government, yet it was delusive: that I had never made a generator which stood for a week, and that I could not keep up the steam for more than two, or three, minutes at one time. These statements obtained credit, the more readily, as any improvement in the art of war, which could be adopted by other powers, and which would have a tendency to place the weak upon a par with the strong, appeared likely to benefit other countries, more than England.

The French government have determined to give our new system a fair trial. A series of experiments have been made at Greenwich, which were attended by the French engineers appointed for that purpose, by the duke d'Angouleme, together with one of his aids, and prince Polignac. Their report was so satisfactory to the French government, that a contract was immediately made. An English engineer of the first class, and one who is very much employed by this government, has joined me in the guarantee of the four points, which some of the English engineers have doubted; namely, the perfect safety of the generator, its indestructibility, the ability to keep the steam up, at any required temperature, for any length of time, and its great economy.

The piece of ordnance is to throw sixty balls, of four pounds each, in a minute, with the correctness of the rifled musket, and to a proportionate distance. A musket is also attached to the same generator, for throwing a stream of lead from the bastion of a fort, and is made so far portable as to be capable of being moved from one bastion to another. This musket is to throw from one hundred to one thousand bullets, per minute, as occasion may require, and that for any given length of time. It was an observation made in my hearing, by his grace, the duke of Wellington, that any country defended by this kind of artillery, would never be invaded, and I am very confidently of this opinion.

As soon as this machine is completed, it is to be exhibited to this government, and to several engineers from other powers, who are over here, for that purpose. I have no fears for the result, neither has Mr. Lukens, since he witnessed the experiment made for the French government. He saw the steam gun discharge at the rate of from 500 to 1000 balls per minute, and the steam blowing off at the escape valve, during the whole time; he is equally confident with myself, that the steam may be kept up in such a manner as to discharge a constant stream of balls during the whole day, if required. As regards economy, I am within the truth, when I say that, if the discharges are rapid, one pound of coals will throw as many balls as four pounds of powder.

It has been stated, as an objection to the steam gun, that it would take too long to get up the steam, in case of an attack. To this I answer, that a very small quantity of fire will keep the generators sufficiently heated, when there is no water in them: and that when there is any chance of their being suddenly wanted, they should be kept heated in this way. The heat of the generators would last long enough to give off steam; until the fire is sufficiently increased to furnish a constant supply. For naval purposes this cannot be an objection, as the steam must always be up. Lord Exmouth, after witnessing a few showers of lead, observed, that he believed the time would come, when a steam gun boat, with two steam guns in her bow, would conquer any line-of-battle ship; and Sir George Cockburn said, that the mischief of it was, it

would be to nations what the pistol was to duellists, it would bring all, whether strong or weak, upon a par.*

To prove the safety of my engine I have worked it under a pressure of 1400 lbs. to the square inch, or at a hundred atmospheres, and cut off the steam at one-twelfth of the stroke; this was merely to manifest what could be done with perfect security. My usual pressure is 800 lbs. per inch, cutting off at one-eighth, and letting the steam expand to below 100 lbs. per inch. I let off at the dead point at one flash; the manner of doing this I long to explain to you, but must first get my last patent sealed.†

I am informed that our friend, Dr. Hare, thinks I have ventured beyond my depth; in this he is not singular, nor do I wonder that such an idea should prevail, after the publication of so many absurd things respecting my engine; I had no knowledge of these publications, and of course had no control over them. Indeed, I have been extremely cautious about publishing any thing myself, or sanctioning it in others; my determination having been first to complete the *essential* improvements of which I have been in pursuit. I presume that you have seen my last paper on the compression of water, air, &c. Its publication by the Royal Society has created no small sensation among the philosophers of the old school. The council would not have allowed the reading of it had not Dr. Wollaston and Sir Humphrey Davy witnessed many of the experiments. I shall soon publish an experiment with which I think Dr. Hare will be pleased, as it will, if I mistake not, prove practically, what the doctor has so ably attempted to establish theoretically, namely, that caloric is matter. The proof is simple and direct, and I am persuaded that, when you see it, you will think it conclusive. I was led to the discovery of this fact by my experiments upon steam; the results of many of which have been very extraordinary, and quite unexpected. One of the most striking is the great repellent power of heat. I discovered that a generator, at a certain temperature, although it had a small crack in it, would not emit either water, or steam. This fact I mentioned to a very scientific friend, who questioned its accuracy, and to convince him I tried the experiment; but he concluded that the expansion of the metal must have closed the fissure. To remove every doubt I proposed to drill a small hole through the side of the generator which was accordingly done. After getting the steam up to a proper temperature I took out the plug, and although we were working the engine at thirty atmospheres, nothing was seen or heard to issue from the plug-hole; all was perfectly quiet: I next lowered the temperature, by shutting the damper and opening the furnace door; a singing from the aperture was soon observable, and when a coal was held before it rapid combustion ensued; nothing, however, was yet visible; but as the temperature decreased, the steam became more and more visible, the noise at the same time increasing, until, finally, the roar was tremendous, and might have been heard at the distance of half a mile: this was conclusive. I should mention that at the aperture the iron was red hot.

My belief is, that water cannot be brought into contact with iron, heated to about 1200°, without a force equal to the maximum pressure of steam, which is equal to about 4000 atmospheres, when water is heated to about 1200°. That pressure would, I believe, keep it in contact with iron at any degree of heat, and the steam would then be as dense as water. It is very evident, that if it would require that force to keep the water in contact, heated as it was at the vent hole, thirty atmospheres must be inefficient to effect this: but the experiment affords some data towards answering the question, at what distance from the heated metal the water remained, when under the pressure of thirty atmospheres? We may safely aver, that it exceeded one-eighth of an inch, as the hole was one quarter of an inch in diameter.

After commencing this letter I ascertained that my patent was likely in a few days to pass the great seal, and have delayed forwarding it, until I could give you some account of the effect upon the minds of those engineers who

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* A description of Mr. Perkins's Steam Gun is given in our 31st No. Vol. II.

† This engine is correctly described, with several engravings, in Nos. 100 and 101, Vol. IV.

were open to conviction, of an experiment performed before them. The patent has been sealed, and the engine has had its power and economy tested. The result has been so satisfactory, that an engineer, who employs at least 300 hands, has taken orders to make engines (for I license them out,) with the following guarantee, viz. that of saving half the fuel, and three-fourths of the weight and bulk, with less liability of derangement than ordinary engines. This engineer, whose name is Penn, and who is frequently employed by government, is now making an engine for steam navigation, with a *nine*-inch cylinder, and *twenty* inch stroke; he joins me in guaranteeing it to be of sixty horse power. It will not occupy more than *one-sixth* of the room, nor exceed *one-sixth* of the weight, of the ordinary Boulton and Watt's engine, of the same power.* * * * * * *

The victory which I have obtained has been a glorious one for me. For the last three months many of the engineers had declared me insane, as I had asserted that I could condense and produce a vacuum under the piston, without either an air pump or condensing water; but the tables are now turned, and my triumph over those who have illiberally assailed me is complete. By the next packet you may expect drawings, &c. of my engine; and I hope, within one short year, to take a seat, with my friend Dr. Jones, by the side of a generator, sustaining a pressure of 3000 lbs. to the square inch;† for this pressure on the generator is required to produce a working power of 2000 lbs. to the square inch upon the piston.

PATENT STAGE COACH.

By Mr. T. P. Birt, of the Strand.—*Enrolled July*, 1826.

Viewing our ordinary travelling coaches in their present state to be very admirable and commodious machines; it appears to us to be unreasonable to expect that any individual, however great his ingenuity, can safely make any great and sudden changes in their structure, that shall be more convenient, more elegant, and at the same time conformable to the prevailing customs, habits, and prejudices of the day. The début of a new stage coach is an extremely hazardous undertaking, and the risk of it is considerably increased when any great deviation is made from established practice. In the invention before us there is, perhaps, as much novelty introduced as is consistent with prudence; and the novel features having for their object the reduction of the labour of the horses, and the increased safety and comfort of the passengers, we cannot but regard them as of a useful character, and as deserving the patronage of the public.

Fig. 1 exhibits a side elevation of a new stage coach that is about being started on the Brighton road. Fig. 2 is a plan of the accommodations of the passengers; and Fig. 3 a plan of the splinter-bar with the new appendages: the same letters in each figure refer to similar parts.

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* Mr. Perkins's Boat Engine, *i.e.* the application of his new safety engine to steam navigation, will be given if possible in our next Number; the subject is being engraved.

† Dr. Jones does not appear to relish this friendly proposition of Mr. Perkins. In the introduction to Mr. P.'s letter the Doctor says, "Mr. Perkins complains, and we are sure, justly, that a great deal has been published respecting his engine, which, from its absurdity, has tended to bring the machine into disrepute. For ourselves we confess, that we had ceased to anticipate much from it, and were among those who thought, that Mr. Perkins had attempted impossibilities; to sign our recantation, however, will afford us the most sincere satisfaction: this is one of those tasks from which we shall never shrink, although we instinctively shudder, and incline sideways, when we think of sitting along side a generator, subjected to a pressure of 3000 lbs. to the square inch."

N. B. Mr. Perkins's paper, *on the Explosion of Steam Boilers*, is given in our 101st No. Vol. IV.; and that on the Economy of using Highly-elastic Steam expansively, in No. 5, Vol. I. second series.

Fig. 1.

Fig. 3.

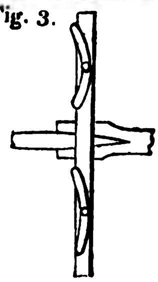
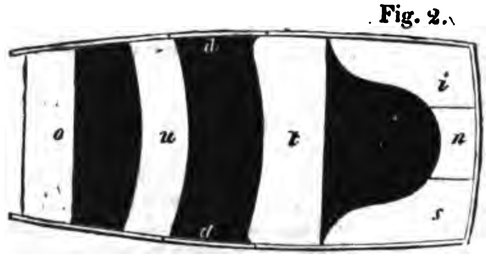


Fig. 2.

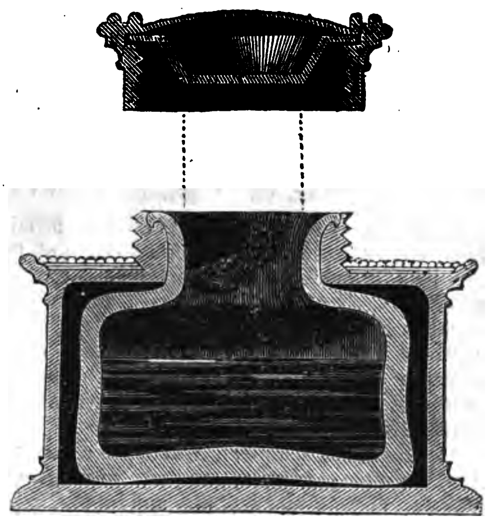


The inside passengers are placed upon a higher level than the outside passengers, and the whole of them sit facing the horses. On the plan, Fig. 2, *i n s* represent the seats of the inside passengers, the bell-shaped dark space before them being for the feet; *o u t* are the seats for the outside passengers, and the dark spaces between them are for their feet. There are three doors, one opening into the inside behind the seat *n*; and two opening into the outside at *d d*. The receptacle for the luggage is at the bottom *c c*; *f* is the coachman's seat, where he is provided with the means of putting a drag into action at pleasure, by means of the lever *g*, the extremity of which is fastened by a rope or chain to the skid-iron, and the latter is supported by a spring arm *j*, which is fixed to the axletree of the hind wheels.

The usual method of yoking the horses to a coach is to attach the two ends of the traces to *two fixed points* on the long front splinter-bar. In this way if the traces are not exactly of a length the horse pulls only on one side when going in a straight line, and when making a curve in the road this is the case invariably; the traces are in consequence subject to double their proper strain, and the horses have all

the work thrown upon one shoulder, instead of it being equalized on both. To remedy this disadvantage the patentee fixes two bent elastic pieces to the splinter bar, as shown in Fig. 3, which turn upon central pivots, and the traces being attached to the extremities of these small curved elastic bars, the pull is made from a single point, like that of the leaders in a four-horsed coach. The advantage derived from this circumstance is greater freedom to the action of the horses, and a better direction of their power: the elastic pieces likewise prevent a great deal of unpleasant jolting usually communicated to the carriage by the motion of the horses. The outside passengers have better accommodations, and from the situation of the luggage and the passengers, the liability of the carriage being upset is materially reduced.

The combination of the invention previously described with this, would make a highly-improved vehicle; and we hope to see them both brought into use.



PATENT CAOUTCHOUC INKSTAND,

By Mr. Doughty, of No. 10, Great Ormond Street.

We have before us one of these excellent inkstands, from which we made the above sectional drawing. The bottle *a*, instead of being made of glass, metal, or other hard substance, is formed of the elastic resin caoutchouc, which neither injures the ink, nor is injured by it: it cannot be broken, nor can it easily be damaged. The chief object of Mr. Doughty in its construction, was to introduce an inkstand, that might not injure his *Ruby and Rhodium* pens, by their nibs being struck against it, which was sometimes done, by incautiously dipping them in glass inkstands. The stopper is of a

conical figure as shown at *d*, and is fixed so as to have a little lateral play in the head, which admits of its adapting itself exactly to the conical neck of the inkstand, and when screwed down, all leaking is prevented; and that the ink may not corrode the metal stopper, the latter is coated with gold or platina.

DOUGHTY'S RUBY PENS.

The nibs of these permanent pens are rubies set in gold, materials which are neither corroded by ink, nor scarcely susceptible of wear. They are made as fine as a crow-quill, and as firm as a swan-quill; possess considerable elasticity, and produce an uniform manuscript, unattainable by ordinary pens. Persons who wish to avoid the trouble of mending pens, will find these instruments a great convenience. We understand that many of Mr. Doughty's ruby pens have been in constant use more than six years, and are still perfect. If a little care be taken of the nibs, by preventing their being struck against hard substances, and occasionally washing with soap and water and a little brush, they will be found, notwithstanding their first cost, *economical* pens.

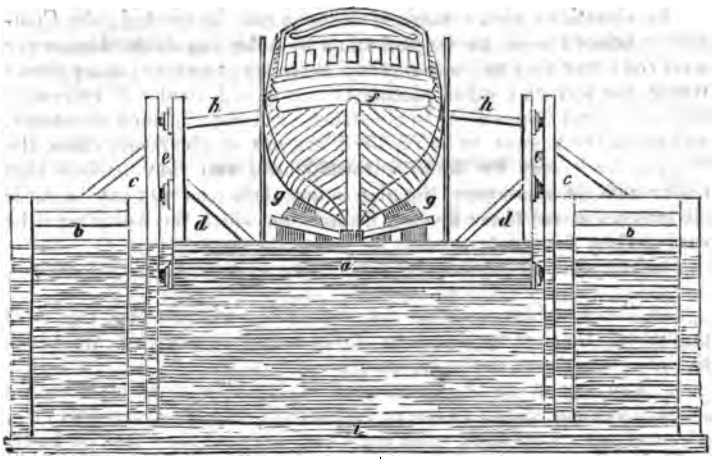
The Rhodium pens made by Mr. Doughty are similarly formed, the nibs of which are extremely durable, though not equally so as the ruby nibbed.

FLOATING DRY DOCK.

By Edward Clark, Civil Engineer, of New York.

This dock is proposed to be constructed by forming a float of timber, which is intended to constitute the bottom of the structure, and which by its buoyancy is to support a vessel within the dock, with its keel above the surface of the water; to attain this end, the float is to be made in the form of a large hollow box, formed of strong logs, firmly joined together, and caulked so as to render it watertight; the capacity of the hollow part must be such, that when exhausted of water by means of pumps, it shall be sufficiently buoyant to sustain itself with its load.

a represents the float; *b b* piers, forming a recess to steady and secure the float; *c c* perpendicular supports and braces, appended firmly to the piers; and *d d* also supports and braces, appended firmly to the float, so as to allow, by means of the rollers *e e*, of the easy and steady ascent and descent of the float, conformably to the motion of the tides and waves, and also of sinking and raising the float in the same place; *f* vessel's stern; *g g* bilge blockings; *h h* braces; all for supporting and steadying the vessel in an upright position; *i* timbers, framed into the piers, forming a bed for the support of the float while sunk. The float *a* is supplied with valves and pumps (not represented in the engraving); and if it be required to float the vessel *f*, nothing more is necessary but to open the valves, when the float, being previously ballasted, will fill with water and sink to its bed. The vessel *f* being now removed, and another made to occupy its place, by means of guides, the valves are to be closed and the pumps



put in motion; and when a quantity of water has been displaced from the float equivalent to the weight of the incumbent vessel, she will be elevated entirely above the water, without loss of power, and placed in a most favourable situation to undergo repairs. A float of this description, for use in sea water, would require to be coppered externally, and occasionally to be filled with some other saline fluid, or with fresh water, to preserve it from the worms.

The Committee of Inventions of the Franklin Institute, at Philadelphia, to whom this invention has been submitted by Mr. Clark, state in their report thereon—That the main objection to docks of this description, made sufficiently capacious for large vessels, and for the operations to be carried on in repairing them, is the unequal pressure to which their bottoms must be subjected, by the weight of the vessel upon them, and the upward pressure of the water. They are aware that by judicious shoring much of the weight of a vessel may be distributed over the bottom, this, however, although it would lessen, would not remove the objection.

Ships, although constructed in a shape, and braced in a manner calculated to render them stable, undergo, in nearly every instance, a change of form, after they are launched;* to this change of form, the float in question would be much more liable, inasmuch as its flat surfaces are less calculated to resist the effects of the pressure to which they are to be subjected.

* We apprehend this effect would never take place, were ships framed on Redmund's admirable plan, fully described in our 85th number, vol. iv. with engravings: it is perfectly unaccountable to us, that not even a practical experiment, by the building of a single ship on this construction, has yet been made. It requires not the gift of prophecy to say, that the invention will be extensively adopted when the term of patent-right has expired; then the patentee will, probably, in return for his study, labour, expence, and anxiety, receive the *honour*,—and the *ungrateful* public, *all the advantage!*—Ed.

In situations where marine railways can be erected, the Committee believe them to be preferable to a floating dock, howsoever well the latter may be constructed; there are, however, many places where the soil and other circumstances would render it extremely difficult, if not impossible, to construct a railway: in such situations, and when the vessels to be repaired are not of the larger class, the floating dock may be found advantageous; and they believe that under such circumstances, the plan before them presents considerable advantages above those floating docks from which the water must be excluded by flood gates.

Philadelphia, April 4th, 1827. THOMAS P. JONES, *Secretary.*

In the Franklin Journal for June last, wherein this report is published, there is appended to it the following reply of Mr. Clark to the observations of the Committee.

"The report of the Committee of Inventions, on my Floating Dock, has been shown to a very respectable ship builder of this city, who concurs in opinion, with the Committee of the Franklin Institute, in respect to the difficulties and objections to the practical use of this plan, provided the ordinary mode of building be resorted to in the construction of the float; but he, nevertheless, thinks, that by increasing the depth of the frame, so as to introduce an extra quantity of timber into it, and securing it well with iron, a dock may be constructed at a reasonable expense, capable of sustaining our largest trading ships, without perceptibly yielding to the inequality of pressure which would be produced by any change of form which the superincumbent vessel had undergone; and, consequently, that such vessel would as readily resume its original form on the deck of such a float, as on the common railway. And further, if such should not be the case, by resorting to the ordinary mode of wedging, the keel of the vessel may be made to conform to the required line.

"*New York, April 25th,* 1827. "EDWARD CLARK."

[Notwithstanding the practical difficulties, under most circumstances, that oppose themselves to this project in its present state, we think it likely that some valuable results may flow from the publication of it. We have ourselves a plan, founded upon Mr. Clark's suggestions, which we purpose explaining when more matured. —EDIT. REG.

PATENT SMITHS' FILES.

By B. COOK, of Birmingham.—*Enrolled August,* 1826.

INSTEAD of making files of solid steel, Mr. Cook forms them of steel plates which are file cut, and fixed by grooves upon stocks with handles; and when the denticulated surfaces of the steel plates become worn they are substituted by new plates.

We apprehend no economy will be found in files so made, except in those very large heavy square files, called *rubbers;* and it is worthy of remark, that *rubber* files are made *in France* of steel plates welded to iron blocks.

COMPARATIVE VIEW OF

FOREIGN AND BRITISH MACHINERY, AND PROCESSES IN THE ARTS.*

CEYLON. N°. IV.—[Continued from page 112.]

Before entering further into the subject of oil-pressing, it is proper we should notice, that there are two distinct processes adopted in England; one cold, the other warm. Hitherto we have only treated of the cold process, or that in which the substances are submitted to pressure, without increasing their natural temperature; by the other, heat is applied artificially, through the medium of steam or air. The chemical as well as medicinal properties of various oils, are more or less altered by heat; the cold drawn oil being preferable for one purpose, and the warm for another. The application of heat to seeds and most oleaginous matters, causes a great portion of the oil to flow out without pressure, besides softening them considerably, and thereby rendering much less mechanical force necessary, to expel the remainder. It is therefore an indispensable point of economy to make use of heat, whenever the application of it does not deteriorate the quality of the oil; for *more* oil is thus obtained with *less* labour.

In the large manufactories, linseed and rape-seed, (which are the chief vegetable substances from which oil is obtained in Europe,) heat is usually employed before pressure, and the separate products of oil in the different stages of the manufacture are preserved, as distinct qualities. The ordinary mill for this purpose, is an extensive range of machinery, and is usually called the Dutch mill, as the industrious people of Holland were the inventors or chief improvers of it: in that country there were many large establishments, which supplied the greater part of Europe with this useful commodity. Considering the Dutch mill as a piece of machinery of nearly a century standing, there is much to admire in many of its arrangements, but its principle (stamping) we do not conceive to be so efficient, as others which we have already described; we shall therefore pass over its description in this place, referring our readers to a very full account of it in Dr. Gregory's Mechanics. In our 35th number, page 168, vol. ii. first series, there is, however, a description of a very superior oil mill, the subject of a recent patent to Mr. John Hull, jun. of Dartford: in this apparatus the seed is heated first, and the pressure subsequently given by the expansive force of steam in a cylinder, gradually moving a piston therein. There is also a description of an admirable apparatus for pressing with steam heat, the patent of Mr. Lord, of Manchester,

* It appearing to us that the heading of our previous papers on this subject, namely, "State of the Arts in Foreign Countries," was not sufficiently comprehensive and explanatory of the nature of the subjects introduced, and might lead many of our readers to suppose that the inventions described were only applicable to Foreign Countries, we have thought it advisable to make the above alteration in the title, of which due notice will be taken in the index to the volume.

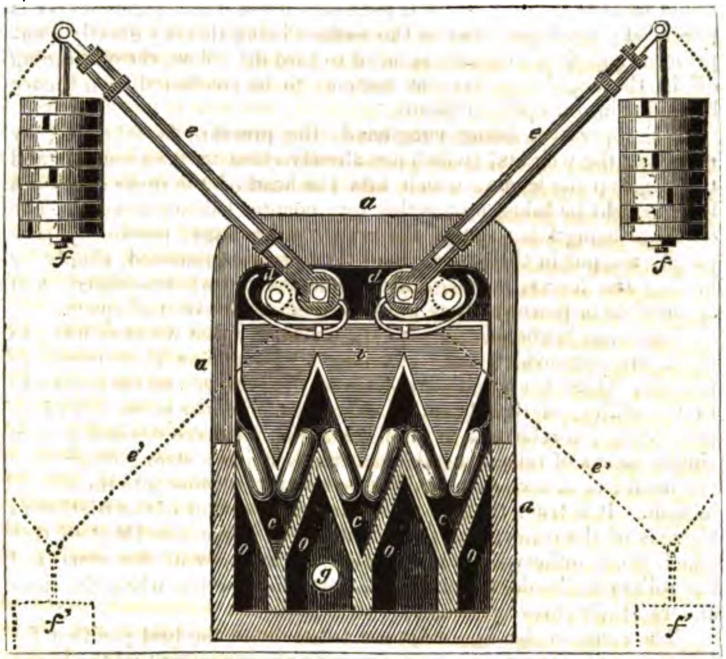
in No. 68, page 308, vol. iii. Register of Arts, first series: and it may be worth the attention of the reader, to examine a prior invention of our own for this very purpose, described in N°. 63, page 226, same volume; in this machine, the heat is communicated to the goods in the press by the conducting power of the metal plates, the extremities of which are placed within chambers of hot air, the latter being supplied by a very small furnace, built in the masonry underneath the press.

The *two* last mentioned presses are of the screw kind, in favour of which we should conceive there is a strong prevailing prejudice, as scarcely any others are used in common; our chief objection to them is, that they require a great deal of labour to work them, and almost as much time to unscrew them, as to screw them down. In expressing oil, the pressure should be as gradually increased as possible, and this cannot be done by the ordinary screw press, by the application of a uniform force at the end of the lever, that is to say, by the power of one man, or any greater uniform power. In the compound lever presses described in our last, *the force is constantly accumulating without labour or attention*, and this we humbly conceive, although our own invention, to be an essential qualification in an oil press. The cost of them is not a tenth part that of a screw press of the same power, while the facility of working them is infinitely greater.

Having in our last number described the hydrostatic press as suited to the *large* manufacturer; and our own simple and cheap lever presses, as adapted to the poor or *small* manufacturer; we have since been endeavouring to contrive a compact apparatus to supply the wants of the *middling* class of manufacturers, to whom a hydrostatic press might be too expensive. In setting ourselves this task, we have kept in view our favourite principle of a self-accumulating power, and have endeavoured to combine in the machine a means of applying heat to the vegetable matter while under pressure, instead of making that process a separate one, as is usual in most manufactories. In the arrangements which we have made for this purpose we cannot help thinking that we have somewhat advanced the art of oil-pressing, and if any of our readers should avail themselves in practice of our hints we shall be happy to be informed of the result of their application. The following is a description of this machine.

HEBERT'S
CAM PRESS FOR THE EXPRESSION OF OILS,
With Heat.

The annexed figure gives a front view of the machine, excepting that the following parts are removed for the better exhibition of its construction, viz. the bearings for the axes of the cams, and a plate which encloses the lower part of the machine, distinguished in the figure by diagonal or sectional lines. *a a a* is a strong frame of cast iron or wood (if the latter the figure would be somewhat different in the outline, and the parts should be strongly bolted together;) the



size may be as circumstances may require, but an average and convenient size would be about three feet high, two feet wide, and one foot deep; *b* is the pressing head, formed into three wedge shaped teeth, and made so as to fit into a bed, *c c c*, of a corresponding figure; *d d* are two cams, firmly attached to two expanding levers *e e*, which are loaded at their extremities, by suspending thereto any required number of flat circular weights. To each of the cams a strong hook, bent to the figure of the former, is fixed; and these hooks, passing through eyes or staples in the head of the press, lift it up when the pressure is taken off, allow it to descend without obstruction, and keep them always connected. At *g* is an aperture for conveying, by means of a pipe, hot air or steam into the chambers *o o o o*, which have openings one into the other; the angular roof of this chamber, particularly adapts it for collecting the heat, from whence it passes off through the interposing iron plates, into the bags under pressure; there will be but little waste of caloric by this disposition of things, and the quantity required would be very little; consequently the expense of fuel must be trifling.

The bags being placed between the wedges as shewn, the pressure is given by loading the levers (which may be drawn out or be made individually of any length to suit the premises), which gradually causes them both to descend to the position shewn by dotted lines at *e' e'*, and *f' f'*; at which time the cams have turned a quarter

round so as to attain a vertical position, when their utmost effect is produced; the bags between the wedges being thereby greatly compressed, and their contents reduced to hard dry cakes, the oil running off in the angular gutters at bottom, to be conducted from thence by a pipe into proper recipients.

The operation being completed, the pressure is taken off by removing the weights, (which are already close to the ground,) and throwing up the levers, which lifts the head of the press; or both levers might be taken up together by a counter balance weight. The oil cakes being taken out of the press, other bags, previously prepared, are put in their place, and the operation renewed, simply by loading the levers, leaving them to do their work unassisted, and accumulate in power as they move through their assigned space.

The cams introduced into all the machinery that we have hitherto seen, are unprovided with any means of reducing their excessive friction, which is a great draw-back to the power, and consequently to the utility, of that beautiful invention. In our press it will be perceived, (on reference to the figure,) that we have devised a very simple means of remedying this defect, by fixing a strong roller near the small end of each cam, which converts the *rubbing* into the *rolling* motion. It is true, that we thus transfer a portion of the friction to the axis of the roller, but the amount of it is not one third of that which would otherwise take place on the surfaces of the cam; and the rollers it should be observed, come into action when the cams undergo their severest labour.

The cams in the figure appear not to be in the best position for commencing the operation, and it would be much better that the levers were fixed to the cams so as to stand more vertically, or nearly at right angles to them; the power would then be considerably lessened at the beginning of the movement, and greatly increased towards the end. It was our intention to have made them so in our drawing, but it happened that we drew the subject upon a block of wood, that did not allow of our representing the levers differently posited, and we had no time to make another drawing of it.

The action and power of this press may be described and estimated thus:—the levers *e e* being *fixed* to the cams, with them act as entire pieces, and must be regarded as two bent levers, in which the points of pressure are constantly changing their position.

Now supposing 5 cwt. appended to each lever, and each lever when drawn out to be 10 feet long, and the pressure to be given at one inch from the fulcrum, this would give a power of 120 to 1—or 60 tons upon the head of the press. Now the head of the press moves through a space, the treble of that which is between the opposite planes of the wedge-shaped teeth, consequently the power is here increased threefold, or raised to 180 tons: then, by applying similar levers and weights to the opposite ends of the axes of the cams, we have the prodigious force of 360 tons upon the goods in this little self-acting and self-supported lever press. Of course we do not consider this calculation to apply to the *average* force of the press, but we have no doubt of its being at least as much

at the close of the operation, which is the only time when the utmost force is required, to squeeze out every particle of fluid that may remain in the cake.

(To be continued.)

SCIENTIFIC INSTITUTIONS.

WESTERN LITERARY AND SCIENTIFIC INSTITUTION.—On Thursday last, Mr. S. Wesley completed a very interesting course of Lectures, which have been enlivened throughout by well selected specimens ably performed on the organ and other instruments. This course will be succeeded by a course on Pneumatics by Professor Millington, commencing on Thursday the 20th instant.

LONDON MECHANICS' INSTITUTION.—At the conclusion of Mr. Downes's Lecture on Magnetism, on Wednesday evening, it was announced to the Members that another Short Hand Class, to be instructed by Mr. Fayerman, would be immediately formed, and that there was still room for a few more members to join the class.

MR. DEWHURST'S THEATRE OF ANATOMY.—Mr. Dewhurst has just commenced delivering a popular Course of Lectures on the Structure and Functions of the Human Body, at his Theatre, 24, Sidmouth Street, Gray's Inn Lane, which are continued every Monday, Wednesday, and Friday Evenings, at 8 o'clock.

Natural History.

THE FLY BIRD.—This little bird, scarcely the size of a humble bee, builds its nest in the hollow of a leaf; choosing the calmest weather for the undertaking, it pierces the edges of the leaf with its pointed bill, and inserting a long fine withered grass thread, laces the extremity together. Within this small space it constructs its domicile, to which it descends through a small round hole near the stem. Its eggs are not larger than those of the ant. Outwardly, the nest appears like a little bag of fine cotton, embroidered at the top with a very lovely foliage.—*London Weekly Review.*

FOUNTAIN TREE.—There are no rivulets or springs in the Island of Ferro, except on a part of the beach which is nearly inaccessible. To supply the place of fountains, however, nature has bestowed upon this island a species of tree, unknown to all other parts of the world. It is of moderate size, and its leaves are straight, long, and evergreen. Around its summit a small cloud perpetually rests, which so drenches the leaves with moisture, that they constantly distil upon the ground a stream of fine clear water. To these trees, as to perennial springs, the inhabitants of Ferro resort, and are thus supplied with a sufficient abundance of water, for themselves and for their cattle.—*Ibid.*

Fine Arts, &c.

PAPER, PARCHMENT, &c.—Old writings are remarked to retain their colour, better than those of a later date; this is not altogether owing to the ink used. Before the early part of the eighteenth

century, alum was not used in the manufacture of paper; now it is; but on paper manufactured without it, ink retains its colour better. With regard to parchment, the skin from which it is made naturally contains a considerable quantity of oil, which prevents the ink from fixing upon it: hence chalk is used in the manufacture of it, which, though it enables us readily to write upon it, produces a very injurious effect upon the ink. The sulphuric acid being abstracted, an insoluble crust is formed, which lies upon the surface, but does not penetrate or combine with the substance of the skin. This crust, after some time, loses much of its colour, adheres so loosely to the parchment, that it may be rubbed off with a wet cloth, leaving but little or no mark upon it,—thus affording a ready means of injuring or altering the writing. Nay, the effect is so readily produced, that accidental circumstances, such as rolling and unrolling it, sometimes causes part of the writing to scale off. This is a defect which I have no doubt might be remedied.—*Mr. Reid in Phil. Magazine.*

LIST OF NEW PATENTS.

Sealed 1827.

PIANO-FORTES.—To Edward Dodd, of 62, Berwick Street, Soho, for certain improvements in pianofortes. To be enrolled by 25th January, 1828.

STEAM ENGINE.—To Thomas Peek, of St. John Street, Clerkenwell, for a revolving steam engine. To be enrolled by 1st February, 1828.

POWER ENGINE.—To William Parkinson, of Barton, Lincolnshire, and Samuel Crossley, of the City Road, London, for a method of constructing and working an engine, for producing power and motion. To be enrolled by 1st February, 1828.

STEAM ENGINE.—To Joseph Maudsley, of Lambeth, for certain improvements in steam engines. To be enrolled by 1st December, 1827.

HORSE COLLARS AND SADDLES.—To Lionel Laken, Esq. of Lewisham, for certain improvements in horse collars and saddles generally. To be enrolled by 1st February. 1828.

MUSICAL INSTRUMENTS.—To Eugene du Mesuil, for improvements or additions to stringed musical instruments. To be enrolled by 1st February, 1828.

STEAM BOILERS.—To Anthony Scott, of Southwark Pottery, Durham, for an apparatus for preventing steam engine boilers and similar vessels from becoming foul, and for cleaning them when foul. To be enrolled by 4th September, 1827.

STEAM ENGINE.—To Peter Burt, of Waterloo Place, Limehouse, for an improved steam engine. To be enrolled by 4th February, 1828.

CANAL LOCKS.—To John Underhill, of Wolverhampton, for improved apparatus for passing boats, &c. from one level to another, with little or no loss of water; which improvements are applicable to the raising of weights upon land. To be enrolled by 13th February, 1828.

BEDS AND MATTRASSES.—To William Dickinson, of Bridge Street, Southwark, for an improved buoyant bed or mattrass. To be enrolled by 13th February, 1828.

BEDSTEADS.—To Thomas Breidenback, of Birmingham, for certain improvements in bedsteads. To be enrolled by 13th February, 1828.

REFRIGERATORIES.—To William Alexis Jarren, of 123, New Bond Street, for certain improvements in apparatus for cooling liquids. To be enrolled by 13th October, 1827.

RAILWAY WAGGONS.—To William Chapman, of Newcastle, for improvements in railway or tram-way waggons. To be enrolled by 15th February, 1828.

WHEELS.—To William Spong, Esq. of Aylesford, Kent, for an invention for diminishing friction in wheels, and the rotary parts generally of machinery. To be enrolled by 15th February, 1828.

GAS.—To Henry Pinkins, late of Philadelphia, but now resident at the Quadrant Hotel. Regent Street, for improved apparatus for generating gas. To be enrolled by 15th February, 1828.

CRANES.—To Lemuel Wellman Wright, of the Borough Road, Surrey, for certain improvements in cranes. To be enrolled by 15th February, 1828.

CUTTING TOBACCO...To the same, for improvements in machinery for cutting tobacco. To be enrolled by 15th February, 1828.

TO OUR READERS AND CORRESPONDENTS.

"AN INQUIRER" is informed that *Mr. Gutteridge's New System of Mensuration* shall be treated of in our next.

The sketch of the Parallel Motion sent to us by J. J. R. is too indistinct for us to make a proper drawing of.

Fig. 1.

L. Hebert, delt.

PATENT DETACHED ALARUM WATCH.

By Mr. J. A. Berrollas, of No. 1, Great Nelson Street, City Road.—*Enrolled June* 1827.

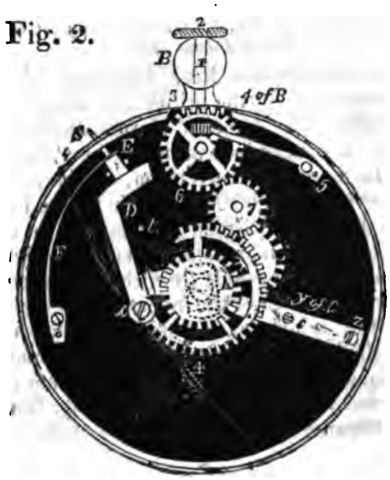
As far as our observations have extended, Mr. Berrollas has excelled his contemporaries in the utility and simplicity of his horological improvements. The detached alarum watch before us, is an improvement upon a former invention by the Patentee, called the *warning watch*. In the present invention, all the useful parts of the warning watch are retained, while those that were inconvenient, or had a tendency to disturb its regular movements, on account of their being connected, are here in a *detached* state, which is the *alarum* itself. The advantages that result from this arrangement are, first, the applicability or adaptation of the invention to all kinds of watches, whatever may be the principles of their construction; second, the alarum being detached from the watch, it can be made to produce a noise sufficiently loud to be used as a house alarum; third, alarum watches as before constructed, were inconvenient, from their bulk, to wear, by this contrivance, they may be made as flat and thin as may

be desired; fourth, the expence is much less than any watches hitherto made of similar performance.

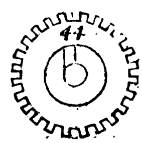
The specification of this invention being so clear as to require no explanation of its construction from us, we shall insert the whole of it nearly verbatim, and without comment, merely observing, that a mechanism performing the part of a monitor, by reminding the wearer of any number of appointments he may have in the course of the day, or to awake him in the morning, is incontestibly a most interesting and valuable companion.

SPECIFICATION.—Now know ye that in compliance with the said proviso I, the said JOSEPH ANTHONY BERROLLAS, do hereby declare that the nature of my said invention, and the manner in which the same is to be produced, applied, and carried into effect, is hereinafter particularly described and set forth; that is to say, my invention consists in a new mechanical arrangement and combination of works, applicable to all purposes where the locking and unlocking of any alarum watch is required, and likewise to the construction of certain parts of the said alarum work, which will be understood by reference to the annexed drawing, and the following description thereof, that is to say, as respects what is usually called the dial work of the watch, to which my contrivances are to be applied, no variation from the usual principles will be necessary, because the canon pinion, minute wheel with its pinion, and the hour wheel, are made as in any other watch as to size and number of teeth, and they have the same performance; but in addition to these parts I have the alarum wheel, which runs by means of a hollow axle upon the arbor of the ordinary hour wheel, and carries the alarum hand or index, which is so fixed thereto that the one cannot turn or move without the other. The alarum wheel, shown at 4, in Fig. 2 of the annexed drawing, and which figure is a general view of my aforesaid alarum work as it appears when the dial plate is removed, need not have teeth upon its edge, if the alarum is to be set to the time for its going off by means of its hand or index, but as this is always inconvenient on account of interfering with the other hands I prefer moving and setting its dial hand or index by a small milled head 2 upon the top of the pendant B, in Figs. 1 and 2, as such milled head being always in its place is more convenient than a detached key, and in this case the pendant work or train of wheels, shown in Fig. 2, become necessary,

Fig. 2.



and the alarum wheel must have teeth, as shown at 4, where a part of the said alarum wheel is represented as broken off to show the conjunction and operation of the pieces C and D to be hereinafter described. The teeth of the wheel 4 take into the teeth of the intermediate wheel 7, which turns on a fixed pin, and is merely to change the direction of the motion; and that wheel in like manner works into another wheel 6, which also engages into the wheel 3 at right angles to it, because this last wheel 3 is fixed upon a square formed at one end of the steel arbor 1, which runs through the pendant and terminates at its other extremity in the milled head or nut 2, which may be made of the same materials as the watch case, or of any other materials, at pleasure. From the above description it will appear evident, that turning the milled head 2 will, through the medium of the arbor 1, and toothed wheels 3, 6, 7, and 4, communicate motion to the alarum wheel and hand above-mentioned in any direction at pleasure; but since the other parts of my aforesaid movements (not yet described) require the motion to be made constantly in the same direction, I make a circular shoulder on the outside of the wheel 3, or apply a smaller wheel on the same square of the arbor 1, which is cut with ratchet teeth, (see 4 of B, Fig, 2), and the spring 5 acting into the upper part of the said ratchet wheel, at once acts the part of a pall or click and spring, and prevents the arbor 1 from turning except in one direction. Having thus shown how the alarum wheel 4 is to be moved, I shall in the next place point out its operation on the rest of the machinery. The hollow axis of the alarum wheel 4 is made of steel, and on its underside is formed into a flat circular plate as at 4 4, which represents the reverse side of the wheel 4, in Fig. 2, and in this plate a notch is cut straight down on one side and sloping on the other, as shown at 4 5, which is a section of the said plate and notch, the straight or perpendicular side of such notch being that which is shown in the direction of a radius of the flat plate in 4 4, (which also represents the toothed wheel 4 communicating with the pendant work); but when such work is omitted, and the alarum is to be set by its hand, the said toothed wheel becomes unnecessary, and all that need be retained is the flat steel plate and its hollow axle, as drawn in the centre of 4 4. The ordinary hour wheel of the movement, marked A, Fig. 2, lies immediately underneath the aforesaid alarum wheel 4, and they turn on a concentrical axis.



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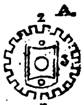
Upon the underside of the hour wheel I apply a piece of flat steel plate, formed into a shape like 1, 2, 3, in the detached figure A of Fig. 2, or of any other convenient form, which I call the detent. This oblong steel plate is spring tempered, has a hole in its centre for the free passage and movement of the canon pinion, and is fixed flat upon the hour wheel by a small screw and steady pins if necessary at 2, a small steel pin of sufficient length to pass through and project beyond the upper side of the hour wheel in a hole made for that purpose, is rivetted into the opposite end of this detent plate at 1, in such manner that when the hour wheel and the alarum wheel are put together in their right places, this pin may play or run upon the flat surface of the steel plate 4 4, and thus keep the end 1 of the detent spring elevated to any required distance, according to the length of the said pin above the hour wheel; but when the said pin comes over the notch before described its end falls into that notch, and thus permits the detent spring to fall and lie flat upon the hour wheel. The reason for forming that notch in the manner before described will now be apparent; it is that the said pin may fall suddenly whenever it passes the perpendicular side of the notch, while from its other side being sloped the alarum wheel may be turned in one direction, and the sloping side acts as an inclined plane to elevate the pin and disengage it again from the said notch when the motion is continued, in the doing which the end 1 of the detent spring 3 will be again raised or separated from the hour wheel. The next piece to be described I call the elevator, which is altogether a thin light spring of steel, shown in its proper place at C, Fig. 2, and likewise de-

2 A



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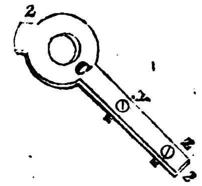


tached in the margin. This piece is fixed in its place by the screw and steady pin *z*. The end near *z* of the elevator is thicker than the other parts, and is so formed that when screwed down the end 2 of the elevator will be elevated or raised above the plate on which it is fixed; *y* is a regulating screw working freely through a hole in the elevator, and is merely to act as a stop for regulating the elevation of the end 2, which may be made greater or less by turning the said screw, because the whole of the elevator is a delicate spring pressing upwards, but made so thin that it will give way to a very slight force impressed upon it. The end 1 of the detent spring 3 (detached Fig. A) works or presses upon the circular plate C of the said elevator in such manner, that when the said detent spring is elevated the plate C of the elevator may be depressed, but whenever the pin 1 of the detent spring 3 falls into the notch in the steel plate 4 4, the pressure of the detent spring is removed from the circular plate C of the elevator, which therefore rises to discharge the alarum, which it does through the medium of another piece, called the propeller, drawn in its proper place and form at D, Fig. 2, and also separately shown in the detached figure D.

I make the propeller of steel, and it is so thick and strong as to be without spring: it is a mere lever turning on the screw *x* as a pivot or fulcrum, and having a projecting piece W on one of its sides, which is formed into an inclined plane and highly polished and hardened, this inclined plane falls directly under the end 2 of the elevator C, also polished at this part; consequently, whenever the elevator is depressed by the detent, or any force, its end 2 will press upon the inclined plane W of the propeller, and drive its end *v* outwards or to the left, and that end *v* is formed into a portion of a circle not concentric with *x*, as will be apparent by inspection of the figure. Lastly, the locker E, Fig. 2, is a cylindrical piece of steel or other metal, one part of which is smaller than the other. The small part projects through a hole in the rim and case, while the thick part acts between two pins upon the plate. The spring F passes over the small part of the locker, thus serving to hold it down to the plate, while at the same time it rests upon the end of the large cylinder and pushes it inwards; or I sometimes apply a fine spiral wire or cylindrical spring over the small end of the locker, so that it may act against the end of the larger part instead of the long spring F, which is then dispensed with; and in this case the locker should be inclosed or covered by a brass cock to be screwed over it, instead of being held in its place by the two pins hereinbefore described; and I give a preference to this last construction as having less friction and being more certain in its action. The use of either of the last-mentioned springs is to cause the locker to press at all times on the circular end *v* of the propeller, and keep them in constant contact. The effect of this pressure is likewise to drive the end *v* of the propeller inwards whenever it is at liberty to move, and *t* is a fixed pin to limit the extent of such movement. The combined effect of the several parts hereinbefore described may, therefore, be shortly recapitulated as follows; that is to say, whenever the detent spring is up, or raised from the hour which it will press upon the circular plate of the elevator C, and thereby depress its end or point 2, which pressing upon the inclined plane W of the propeller D will drive its circular head *v* forwards, and this, by pressing upon the locker E, will cause its small end *s* to protrude from the case of the watch, and in this state it will always remain, except when the pin of the detent falls into the notch of the alarum wheel, (which must happen once in every twelve hours while the watch is going,) and then the falling of the detent will suddenly release the elevator from pressure, and it will rise thereby, withdrawing the pressure of its point 2 from the inclined plane W of the propeller, which will consequently fall back to the stop pin *t* in consequence of the pressure of the spring exerted as aforesaid upon the locker E, the small end *s* of which will therefore be drawn within the case,

and will remain in that position, until the sloping side of the notch 4 4, has been moved round sufficiently to raise the pin of the detent spring again, and has brought it back to its elevated position.

The above is all that is necessary to form the union between the going part of any watch and a detached alarum, because it will be evident that such alarum may be disengaged or set off by the sudden withdrawing of the locker, and that such disengagement may take place at any required time, by a due and proper disposition of the hour and alarum hands upon their respective pivots or arbors.

I shall next proceed to describe the manner in which the alarum movement is operated upon by the means hereinbefore described; before doing which I will observe that there are several kinds of alarums,—the one striking upon a bell, as generally used,—another acting like a watchman's rattle, by a combination of machinery,—and others making different noises;—but in either case the alarum work consists of a train of wheels and pinions working in an ordinary frame of plates and pillars, urged by a weight or spring, and terminating in a fly; consequently to such movement generally I make no claim, but confine my invention to the means of connecting and setting off any kind of alarum work at a certain fixed hour or time, by means of the combination of machinery hereinbefore described.

An alarum movement in its separate state is represented at G H in the annexed figure, and consists of a frame, the upper plate of which is nearly

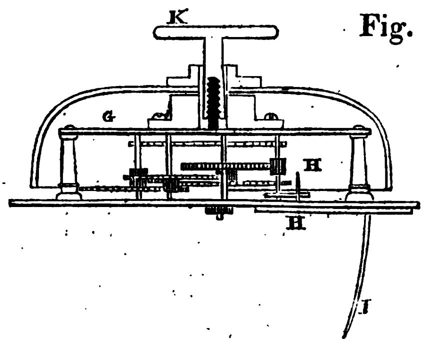
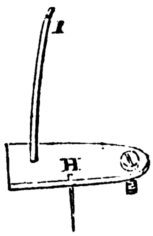


Fig. 3.

half an inch less than the pillar plate, in order that the works may be covered by and contained within the bell, as shown at Fig. 3, which is a section or profile of the alarum movement. A going barrel which contains the main spring is placed in the centre of the said frame, and a steel wheel cut with ratchet teeth to work the hammer is fixed on the upper part of the said barrel, its other side carrying the main wheel to drive the train, which generally consists of three wheels and four pinions. The alarum hammer has a spring and a regulating spring on the opposite side of the plate, as shown at K, Fig. 5. The fly pinion has an arm of steel fixed on its arbor, and as this comes in contact with the projecting pin, the works are locked, and the alarum prevented from running down; but so soon as the pin H is moved the whole is at liberty and free to move: the pin H passes through a hole in the plate and rises from the locking lever H on the other side of the plate, as shown in Fig. 5, where it may be seen that this locking lever turns on a screw pivot at its inner end, and is constantly pressed to one side by the force of the spring P, which operates in such a direction as to throw the pin out of contact with the steel arm of the fly arbor, and consequently always keeps the alarum work in a free state for motion, but it may be locked at any time by pushing the locking lever H, Fig. 5, backwards or against the action of its spring P; a wire tail I rises perpendicularly out of the outer end of the locking lever H, and it is this wire tail that is to be engaged with the small end *s* of the locker E *s*, Fig. 2,

Fig. 5.



whenever the alarum is to be wound up and set. This locking lever H with its two pins is shown in a detached state, and it is the application of this lever, and the connection of its pin I with the projecting end of the locker *s* for discharging the alarum movement, which I alone claim as a part of my invention. Fig. 1 shows a watch having all the above described parts appertaining thereto, and placed upon one of the aforesaid detached alarum movements, I, being the case of the alarum formed of open work chased or otherwise ornamented, and having the appearance when empty of the ordinary receptacle of an external watch case, M being the usual rim that shuts down over the watch with a spring catch, and thereby holds it steadily in its proper position; the alarum movement is fixed in this external case, with the pillar plate upwards and the works and bell downwards, consequently the wire tail I, Fig. 5, projects upwards into the case, and in placing the watch within it it is necessary to observe that the projecting end of the locker *s*, Fig. 2, comes behind and engages with this wire tail, as seen at H E, Fig. 1, in such manner that it may push back the locking lever H, Fig. 5, and thereby lock the train of the alarum, when the rim M is to be shut down, and the alarum hand set as aforesaid to the time upon the dial when it is to be discharged. The alarum may then be wound up by the key or milled head K, Fig. 3, which is screwed upon the main spring arbor, so that it can only turn it in one direction without unscrewing, and the machine will be ready to operate, because at the assigned hour and minute the ends of the locker will be withdrawn into the watch, thereby releasing the wire tail I and the locking lever H, Fig. 5, by which the alarum will be discharged and will instantly run down.

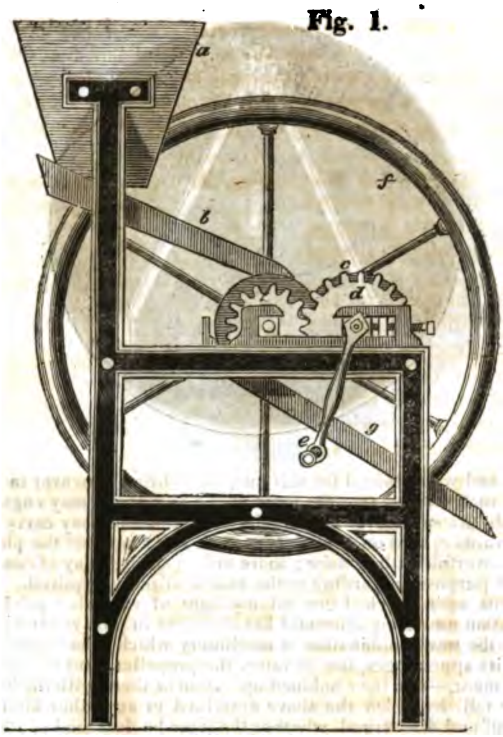
What has been said of the bell alarum movement equally applies to rattle movements, because they consist of the same parts, and are constructed and used in the same manner, except only that the bell, the hammer, and the steel ratchet wheel for working the same, and the springs connected therewith are dispensed with, and in lieu thereof the rattle movement, shown in Fig. 6, is substituted. This consists of two strong steel springs N N, so fixed or screwed upon the outside of the upper plate that they may both press in the same direction against the two strong pins or studs *q q* fixed to receive them, and the upper plate may in this construction be made of the same diameter as the lower plate, because there is no bell to go over it. A coarse steel pinion M is fixed on to a square upon the continued arbor of the first wheel in the

Fig. 6.

movement, and which wheel for this purpose is brought nearer to the edge of the plate in such manner that the lever of the said pinion may engage with the ends of both the springs N N, and by its revolution may carry them some distance towards r, and on their return they strike against the pins q q, and produce a powerful rattling noise; more or less springs may of course be used for a similar purpose, according to the extent of noise required.

The points upon which I gronnd my right of exclusive privilege to the above invention under my aforesaid hereinbefore in part recited patent, are, therefore,—the new combination of machinery which I have produced in the detent and its appendages, the elevator, the propeller, and the locker, in the watch movement,—and the combined operation of these with the locking lever and its wire tail, by which the above described or any other kind of alarum may be set off and discharged, whether the same be detached or attached from the said watch,—and likewise for the kind of case or support which I have adopted for holding, confining, and containing the said watch or other movement in such manner that it may be attached or detached, and may form an elegant and useful article of ornamental furniture while it will contain a larger bell, rattle, or other apparatus, for producing noise, than could possibly be applied in the size of any watch, whereby it may serve for wear or distant purposes, or may even answer the purpose of making a large striking movement applicable to a small watch; but I hereby distinctly disclaim any exclusive right, benefit, or advantage, to the individual wheels, levers, springs, or other parts of the movements above described, which I claim only in their combined and collective capacity; and I further disclaim any right or title to the invention of the train of wheels, described as being necessary in either of the alarum movements, and likewise to the train of wheels hereinbefore described for moving the alarum hand from the pendant or other part of the movement, further than the same are already secured to me by a former patent, which I obtained in the year 1809, in which the same kind of train of wheels is described as applied to a different purpose: my present patent being for a new mechanical arrangement and combination of parts already well known, but now applied by me to the production of a new purpose and effect. —In Witness, &c.

Fig. 1.



IMPROVED MALT, OAT AND SUGAR MILL.

By Messrs. Alexander Christie & Co. of Sheffield.

It seems impossible to construct any machine that shall be more simple, and at the same time as efficacious for crushing seeds, grain, &c. as the one before us. Considered as an invention therefore, there can be nothing very novel in its arrangements, but as an ably manufactured machine, of tried utility, it is well deserving of attention. The greater part of the hand crushing mills that we have seen, are "got up" in so rough a manner, and are so deficient in truth and solidity of workmanship, as to be soon rendered incapable of withstanding, for any length of time, the powerful resistance made by the materials in passing between the cylinders. The elasticity of wooden framing unsuiting it for such a purpose as this, Messrs. Christie & Co. construct the whole of cast iron, having a very neat and finished appearance. The crushing cylinders are turned with great truth to a bright surface: the plummer blocks are of gun metal, moving in iron slides, in which they are adjusted or set at pleasure by the action of regulating screws.

The machine from which we made the above drawings, we saw

at Mr. Wallis's large ironmongery warehouse, the corner of Brook Street, Holborn, when we took the opportunity of making the experiment upon some rice, which the mill at once, and with very little force, reduced to a coarse powder by simply crushing instead of grinding it, as is customary for a variety of culinary and other purposes.

Fig. 2.

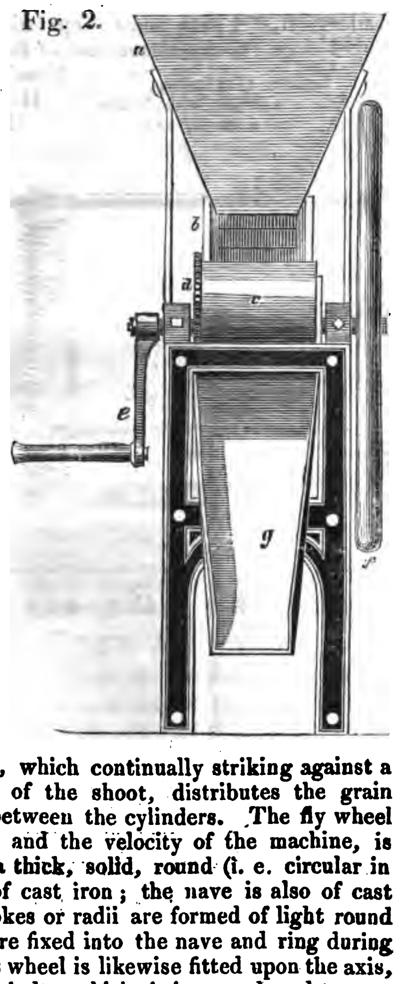


Fig. 1 represents a side elevation, and Fig. 2 an end view of the machine: the same letters in each refer to similar parts.

a is the hopper, at the bottom is a sliding trap, to regulate at pleasure the discharge into the feeding shoot *b*, which is provided with a bottom of open wire work, to allow the dust and other impurities to pass through, previous to the descent of the grain or other materials between the cylindrical rollers *c c*; rotary motion is given to these rollers in opposite directions, by means of two cog wheels on their axes, one of which, *d*, being turned by the winch *e*, gives motion to the other. The grain, after passing between the rollers, is received in a crushed state upon the shoot *g*, which conducts it into a bag or other receptacle. To cause a shaking motion to the feeding shoot *b*, there is fixed a stub wheel on the axis of the small cylinder, which continually striking against a wooden spring at the bottom of the shoot, distributes the grain evenly over the surface, and between the cylinders. The fly wheel *f*, which regulates the power and the velocity of the machine, is admirably constructed; it is a thick, solid, round (i. e. circular in its transverse section), ring of cast iron; the nave is also of cast iron, well turned, and the spokes or radii are formed of light round bars of wrought iron, which are fixed into the nave and ring during the casting of the latter. This wheel is likewise fitted upon the axis, by an arrangement of four key bolts, which, being numbered to correspond with the notches they are inserted to, the wheel may at any time be taken off, and refixed at pleasure with exactness in two minutes, so as to run in its true centre and at right angles with the line of the axis.

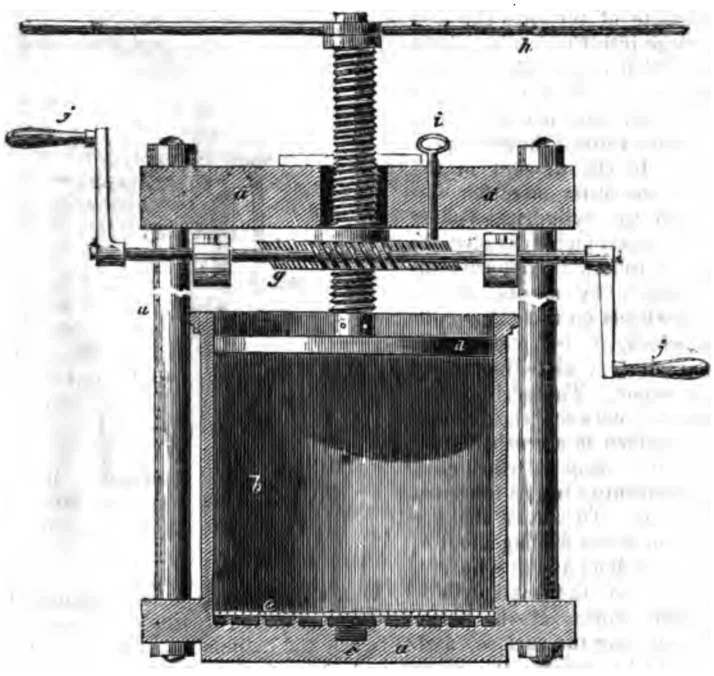
ANATOMICAL PREPARATIONS.

To the Editor.

SIR,—In No. 9 of your valuable work, (old series,) you mention that anatomical preparations, may be preserved by a solution of muriate of soda: I have much pleasure in confirming Mr. W. Cooke's discovery of this fact, and at the same time inform your readers, that I have some preparations in my museum, thus preserved since the commencement of the year 1824.

Your's obediently,
H. W. DEWHURST,
Lecturer on Anatomy, &c. &c.

Theatre of Anatomy,
21, *Sidmouth Street, Gray's Inn Lane, September* 20, 1827.



BLYTHE'S BLUBBER PRESS.

MR. EDITOR,—I have taken the liberty of enclosing, for insertion in your valuable and widely circulated journal, a sketch of a press, which has been advantageously applied in expressing the oil from "scraps," (pieces of the blubber or fat of a whale after being boiled), in which a great quantity of oil remains after the operation of boiling. All this oil was formerly allowed to remain in the scraps, and with them made use of as fuel and burned under the "try-pots," or boilers; in consequence of the oil being so very inflammable, serious

accidents occurred, owing to the flames issuing from the furnace and catching the oil in the "try-pots." By the use of this press the danger is entirely obviated, owing to the oil (which would otherwise have been burnt to waste, being expressed from the scraps and saved) forming, as you may easily imagine, no small part of a ship's cargo. These presses I believe may be procured of Messrs. Blythe and Sons, Limehouse, with whom I understand the idea first originated.

It is necessary to add, that these presses are not only useful for the purpose above described, but may be applied to many descriptions of pressing, where portability and great power are required.

I must here take leave of this subject and fish for another, in hope of finding one of as much public utility as that which I now transmit to you.*

I am, Sir, your constant reader,
AN OLD FISHERMAN.

Rotherhithe, Sept. 18, 1827.

Description.—*a a a a*, is the frame of the press consisting of a strong cast iron bed and head, and wrought iron jambs, secured at each end by nuts and screws; *b* is a hollow cylinder, with an iron plate perforated with small holes, resting upon ribs in the bottom of the cast iron cylinder, as shewn at *e*. *c* is a spout for allowing the oil to run off; *d* is a follower, also made of cast iron; *f* a screw made of wrought iron, and fitted into an internal screw, in the wheel *g*; *h* is a lever for screwing down the follower when great speed and but little pressure is required. *j* is a bolt, which is put in to prevent the wheel *g* from turning round, which then becomes a box for the screw to work through; this bolt is taken out when greater pressure is required, and the power of one or more men applied to the handles *j j*, which turn an endless screw, and give motion to the wheel as shewn at *o*; the wheel in its revolution bites upon the underside of the head of the press, and consequently forces the screw downwards, with the increased power of the endless screw, and wheel and main screw. The scraps are put into the cylinder warm, with a mattrass (wicker basket), ½ of an inch thick in the bottom, to prevent the hard substance filling up the holes in the plate at *e*.

After the press is charged, it is set to work by first screwing down with the single power of the screw and lever, and finished by adding the power of the wheel and endless screw.

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* We so much admire the produce of our "Old Fisherman's" Net, that we are anxious he should send us something more at his next haul;—let it be any thing but a gudgeon! In our next number we shall be able to gratify him with the representation of a very "odd fish" that does not swim in his waters.—ED.

NEW SYSTEM OF MENSURATION

By Mr. Gutteridge.

In No. 4 of our New Series we inserted a communication, detailing a course of Experiments made by *Mr. Gutteridge* in Gauging a Vat at the distillery of *Messrs. Booth,* at the Cow-cross Street Rectifying House; and as that communication referred to *a new unit of measure* which was there used in gauging, and with which the public, we presume, are very little acquainted, we stated in a *note* that at a future period we would give some illustration of the nature of that and another *unit of measure* invented by *Mr. Gutteridge:* we, therefore, now redeem our pledge, by giving a few practical examples which cannot be perused without at once convincing those previously unacquainted with the invention, of its great simplicity and utility; and we have gone into the subject even a little farther than we originally promised, under an impression that in so doing we are contributing to that general fund of useful information which it must always be both the object and interest of our readers to possess.

The *units* of measure of *Mr. Gutteridge's Invention* are numbered 1, 2, 3, 5, 6, 7, 8, No. 4 being the common decimal foot, which is introduced to complete the series.

These units are all *decimally* subdivided into 100 equal parts; and are the linear roots of the *cubic* and *superficial* bodies and spaces to be measured, the derivation of each of which we have given in simple equations, in the manner used by *Mr. Gutteridge* in his Lectures at the *London Mechanics' Institution,* some account of which may be seen in Nos. 15 and 16 of the new Mechanics' Register.

At the foot of the *formulæ* (numbered from 1 to 8) are seven "examples with precepts," each being stated in the usual terms, and in their correspondents of the scales invented by *Mr. Gutteridge,* numbered from 1 to 7.

In the parallelopipedons (examples Nos. 1 and 7) the length, *breadth,* and *depth,* are indicated by the initials *l b d.* In the cylinders (examples 2, 3, and 5,) the *diameter* and *length* are indicated by the initials. *d* (in example 4) indicates the diameter; and in example 6, *g* indicates the girth, and *l* the length.

In each case the equivalents, as nearly as may be, to the first decimal of the inch, foot, &c. are given to correspond to the new units and decimals standing respectively opposite to those dimensions:—thus, in example 1 the length of the parallelopipedon is 234.88 inches, the equivalent of which, in units No. 1, (the imperial gallon rectilinear units) is 36.02, and so of the rest.

In the common precept to this it is seen that the product of the dimensions requires to be divided by 277.274; but the corresponding precept from the rectilinear gallon unit shows that there is no divisor at all requisite to obtain the same result; and hence, in the words of *Dr. Olinthus Gregory,* "half the usual calculation is got rid of in all cases of gauging, if the new unit be substituted for the inch."

The reason is so obvious, that the learned and scientific *Dr. Mac Donnell,* of Trinity College, Dublin, has expressed his *surprise*

"*that it should not before have occurred to practical men;*" and every individual member of the Commissioners of Weights and Measures (*Dr. Wollaston, Dr. Young, D. Gilbert, Esq.* and *Captain Kater,*) have subscribed to the *originality* and *utility* of the invention, in confirmation of which their chairman, *Sir George Clerk, Bart.* laid a report before the Lords Commissioners of the Treasury, on the 31st of May, 1825; and it is therefore needless for us to insist either on the originality and utility, or on the preference which will be given to the invention by all men of science. The unit No. 3 is the root of the *circular* gallon, as that of No. 1 is of the rectilinear gallon, and hence this unit is called by the inventor '*the curvilinear gallon*'; and example 3 shows that it supersedes both the divisor and factor commonly used to reduce cubical inches to gallons; palpably proving that the inch in gauging is both unnecessary, and, in every respect, inferior to these units; and therefore we are pleased to see that the author has just published a Treatise, detailing many of the most useful branches of Gauging and practical Mensuration, which derive advantage from his invention. The unit No. 2 is the root of the *area* in gallons for a unit of No. 1 in depth, as that of No. 3 is for its own depth; the use of which is to tabulate in the subdivisions of No. 1 when greater precision than No. 3 may be thought necessary.

No. 4 is the common decimal foot, preserved in the series to show the exact analogy between Nos. 4, 5, and 6, in respect of the foot, as the Nos. 1, 2, and 3, for gallons; from which it is evident, that the superficial feet are had, of any circle, by squaring the diameter only; and the cubic feet in any cylindric log of timber, stone, &c. by multiplying the square of the diameter by the length.

No. 7 is a unit prepared to save the trouble of passing the string round a log of timber to measure the customary content; the square of the diameter (from No. 7) being multiplied by the length, producing the same as the square of the girth (or quarter circumference) by such length. In measuring standing timber this invention affords even greater facilities than for lying trees: and No. 8 being the root of what is called the superficial foot of timber, produces that content by multiplying the length, breadth, and depth, continually from only *one* unit; but although every one of these, which are only a very limited number of the purposes to which Mr. Gutteridge applies his system, are useful, none are so much so as those for the gallon; of which the French *decimetre* in respect of the *litre,* is at once a parallel, so far as regards No. 1: but it is evident, that as regards the curvilinear units of Mr. Gutteridge, a decided improvement is made even on the French system; and we are not surprised to learn that those improvements are already actually imitated both in France and the Netherlands; whilst in England, where they were invented, they have scarcely been heard of, much less adopted,—a circumstance not exactly in accordance with that degree of emulation to which we lay claim; but which may, perhaps, in some degree, be ascribed to the principles of the ingenious author not being generally known.

GUTTERIDGE'S UNITS OF MEASURE; THEIR DATA, APPLICATION, &C.

Gutteridge's Invention for Imperial Gallons.

			Inches.		Units.
No. 1.	$\sqrt[3]{277.274}$	=	6.52083	=	1
No. 2.	$\sqrt[3]{277.274} \times \sqrt{\frac{1}{.7854}}$	=	7.35784	=	1
No. 3.	$\sqrt[3]{\frac{277.274}{.7854}}$	=	7.0676	=	1

Not G.'s Invention.

No. 4.	The common Foot	1

Gutteridge's Invention for Feet.

			Feet.		
No. 5.	$\sqrt{\frac{1}{.7854}}$	=	1.12836	=	1
No. 6.	$\sqrt[3]{\frac{1}{.7854}}$	=	1.08383	=	1
No. 7.	$\frac{1}{.7854}$	=	1.2732	=	1
			Inches.		
No. 8.	$\sqrt[3]{144}$	=	5.2415	=	1

EXAMPLES.

For Gallons.

1.—A Paralellopipedon for Gallons.

		Inches.		No. 1.
l	=	231.88	=	36.02
b	=	160.54	=	24.62
d	=	231.88	=	36.02

Precept.

Inch. $\frac{l\,b\,d}{277.274} = c$ New. $l\,b\,d = c$

2.—A Cylinder for Gallons, i.e.

		Inches.			New.
d	=	51.5	=	7	No. 1.
l	=	78.2	=	12	No. 2.

Precept.

$\frac{.7854\,d\,d\,l}{277.274} = c$ $d\,d\,l = c$

3.—A Cylinder for Gallons.

		Inches.			New.
d	=	21.2	=	3	No. 3.
l	=	63.6	=	9	Do.

Precept.

$\frac{.7854\,d\,d\,l}{277.274} = c$ $d\,d\,l = c$

For Feet.

4.—A Circle for its Area in Feet, i.e.

No. 4.		No. 5.
6.77	=	6

Precept.

$.7854\,d\,d = c$ $d^2 = c$

5.—A Cylinder for Cubic Feet.

		No. 4.		No. 6.
d	=	3.25	=	3
l	=	9.75	=	9

Precept.

$.7854\,d\,d\,l = c$ $d\,d\,l = c$

6.—A Tree, to find its customary Contents in Feet, i.e.

		No. 4.					
g	=	8	=	d	=	2	No. 7.
l	=	20	=	l	=	20	No. 4.

Precept.

$\overline{g \div 4}^2 \times l = c$ $d\,d\,l = c$

7.—A Parallelopipedon in superficial Feet at One Inch thick, i.e.

		Inches.		No. 8.
l	=	262	=	50
b	=	36.7	=	7
d	=	26.2	=	5

Precept.

$\frac{l\,b\,d}{144} = c$ $l\,b\,d = c$

SCIENTIFIC INSTITUTIONS.

London Mechanics' Institution.—At the conclusion of Mr. Downes's Lecture on the *Methods of determining the Longitude of Places*, on Wednesday last, it was announced to the Members, that Mr. Chapman would deliver a Lecture on *Imagination*, Wednesday the 3d October; and Professor Millington stated, on concluding his second last Friday, that he should complete the subject of *Hydrostatics* in one more lecture; and that in order to accommodate Mr. Wallis, who would commence a course of Lectures on *Astronomy* on the 10th October, he should defer his Lectures on *Hydraulics* till after the Astronomical Course.

Royal Institution.—We understand that the morning Lectures at this Institution are about to commence; the particulars of which we shall be able to give in our next number.

Spitalfields Mechanics' Institution.—On Tuesday the 18th September, Mr. J. Pelham delivered the first of a course of Lectures on *Optics*.

Hydraulics.

Mr. J. M. Cooper, of Gintdhall, (Vermont,) has just invented a machine of great power, a model of which he is now exhibiting. It consists of a cylinder 8 inches long, by as many in diameter, with a winch, the two extremities of which are attached to a pivot. The strength of four men is sufficient to make it throw constantly a stream of water ¾ of an inch in thickness, 120 feet distance, in a straight line, and more than 90 feet perpendicular height. It is said that this machine is constructed upon quite a new principle. The inventor has given it the name of the Rotatory Piston, although in point of fact, it has neither piston nor valve. It has rather the appearance of a wheel, which forms a vacuum on one side, and a strong compression on the other. The volume of the water raised by it at a single turn, surpasses, it is said, that of the whole machine itself. It is thought that it will soon replace the ordinary pumps, as well as the fire engines. A manufactory has been established for making it upon a large scale, and agents have been sent to Europe, to prepare for its introduction into England and France.—*French Paper.*

Rural Economy.

Machine for Digging Potatoes.—Mr. Michael Bury, of Swords, Eng. has invented a machine, simple in its construction and principle, by which, with two horses and one attendant, an acre of potatoes may be dug out in one hour. Also an acre of ground (previously ploughed for oats or other grain) can be harrowed by it in an hour, with two horses and one attendant, thereby effecting, in the branch of harrowing, a saving of upwards of 93 per cent., or in other words, doing the work of 82 horses and 16 attendants with 2 horses and 1 attendant.—*American Paper.*

Useful Arts.

Preservation of Skins.—M. I. Stegar, a tanner at Tymau, in Hungary, uses with great advantage the pyroligneous acid, in preserving skins from putrefaction, and in recovering them when attacked. They are deprived of none of their useful qualities, if covered by means of a brush, with the acid, which they absorb very readily.

Ancient Mode of Writing.—When alphabetical writing first began to usurp the place of hieroglyphics, the mode of commencing each line under the beginning of the preceding was unknown; and the *boustrophic* mode, which ran as follows, was practised.

" In the beginning
God created the
Heaven and the
Earth; and the
earth was" &c.

London Weekly Review.

LIST OF EXPIRED PATENTS.

Continued from p. 64.

KNITTING.—To Robert Hall, and Samuel Hall, of Basford, Nottingham, for their machine for the dressing, getting up, or finishing frame work knitted goods from the stocking frame.

GUN LOCKS.—To Joseph Egg, of Charing Cross, London, for a method of applying and improving locks.

DOVETAIL.—To John Bennett, of Bristol, for a metal dovetail joint, applicable to portable and other furniture.

WINDOW FRAMES.—To James Timmins, of Birmingham, Warwickshire, for an improved method of making and erecting hot houses, and all horticultural buildings, and also the making of pine pits, cucumber lights, sashes, and church windows.

CHIMNEY PIECES.—To Robert Lewis, of Birmingham, Warwickshire, for a method of making brass chimney pieces.

SODA WATER.—To Charles Plinth, of Temple Street, London, for various improvements in the construction of a fountain (which he denominates "The Regency Portable Fountain,") used in the manufacture of water simply impregnated with fixed air or carbonic acid, and of artificial mineral and soda waters, and other liquids.

MECHANICAL POWER.—To John Rangeley, of Oakwell Hall, Yorkshire, for an improved method of constructing and working engines for raising weights, turning machinery, &c.

DOUBLE CANVASS.—To Robert Campion, of Whitby, Yorkshire, for a new and improved method of making and manufacturing double canvass and sail cloth without starch.

CANAL LOCKS.—To C. A. Busby, of New Millman Street, London, for certain methods of constructing locks of canals, docks, and navigations.

CLOTH MANUFACTURE.—To R. Coupland and Frederick Coupland, of Leeds, Yorkshire, for their manufacture of shawls, cords, cloths, &c. from a mixture of animal and vegetable wool, without oil.

COOKING.—To S. Whitfield, of Birmingham, Warwickshire, for improved mountings or furniture for culinary and other utensils.

BRICK MAKING.—To J. Hamilton, of Dublin, for improvements on machines for making bricks, tiles, and earthenwares.

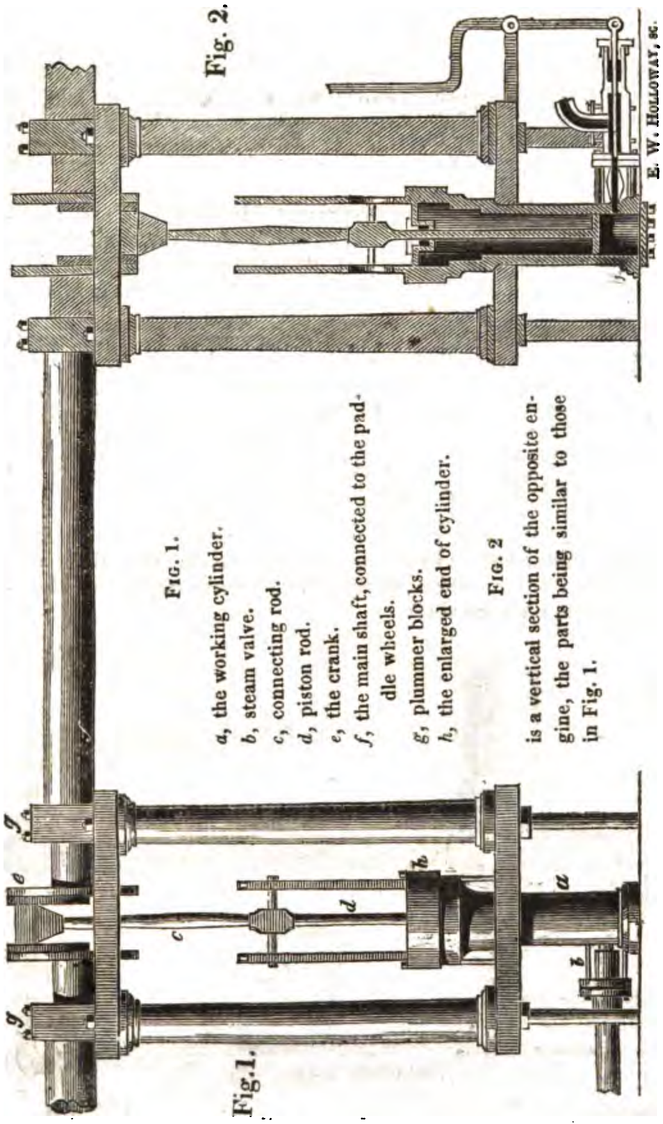
ENDLESS CHAIN.—To T. Mead, of Scot Street, York, for an endless chain of a peculiar construction, with appendages, which with the assistance of other mechanical apparatus is applicable to a variety of useful purposes.

TO OUR READERS AND CORRESPONDENTS.

The List of New Patents will be given in our next.

The Questions proposed by a Member of the London Mechanics' Institution are not adapted for insertion in this work: we recommend him to apply to a coal-meter for the information he seeks.

Pro Bono Publico and A Friend are intended for insertion.



MR. PERKINS'S PATENT SAFETY BOAT ENGINE.

MR. PERKINS'S PATENT SAFETY BOAT ENGINE.

To the Editor.

Sir,—I have now the pleasure of redeeming my promise of furnishing you with a drawing of Mr. Perkins's mode of applying his new safety engine to the purposes of navigation; in my explanation of which I shall be very brief, as you have already fully described the invention as applied to general purposes in your 100th and 101st numbers.

The accompanying drawings represent Mr. Perkins's first modification of a boat engine. Fig. 1 is an elevation of the engine; Fig. 2 a vertical section of its counterpart, with the connecting main shaft between them; and Fig. 3 is a section on an enlarged scale of some of the most essential parts.

The steam having been generated in the manner described in the former accounts above alluded to, is here used expansively at the enormous pressure of 2000 *lbs. upon the square inch*, and shut off at *one-sixteenth* part of its stroke; the steam is permitted to act only on the underside of the piston (instead of the upper side, as in the former cases); the enlargement of the cylinder for the egression of the steam is consequently at the top. The pistons are six inches in diameter, with a twenty-inch stroke. The power is considered about thirty horses, that is, 15 to each cylinder; but by using double the quantity of coals Mr. Perkins offers to guarantee the conversion of *each cylinder into a* 30-*horse power*, which would afford a most important advantage to a vessel on a lee shore.

Fig. 3.

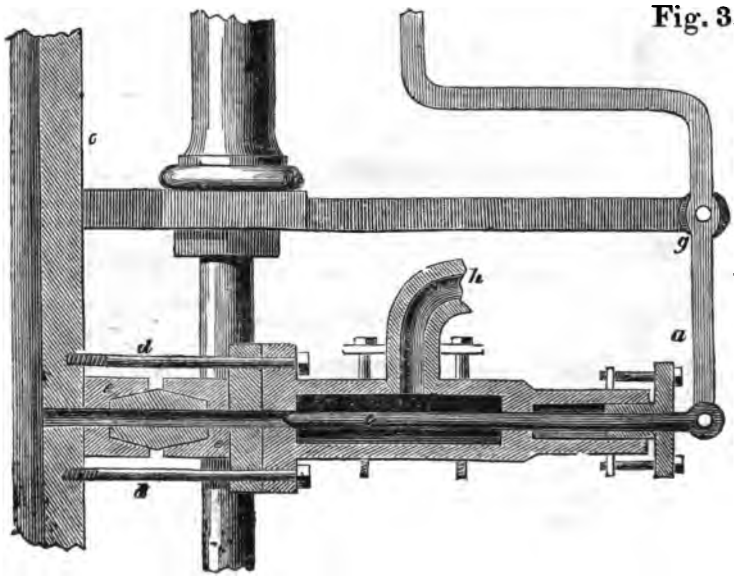


Fig. 3 (annexed) gives a section of the steam valve on an enlarged scale, as it possesses peculiar claims to notice: *a* is a lever suspended upon a pivot at *g*; which by the revolution of a cam fixed on the main shaft (*f*, Fig. 1) draws back the rod *b* of the valve, when the steam from the generator is admitted by the tube *h*, and rushes into the working cylinder *c*, through the pipe *e e*, which is connected to the cylinder, by the strong double conical joint shown and before particularly described.

I remain, &c. C. DAVY.

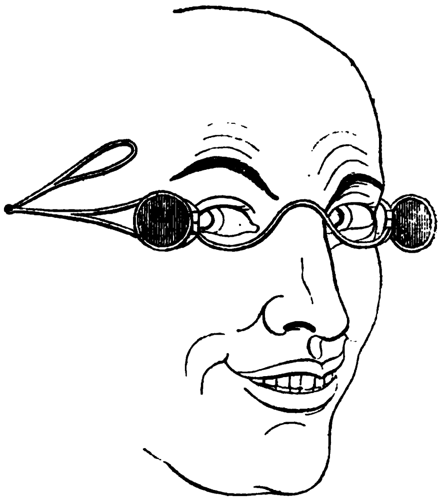
[We have lately seen an engine that Mr. Perkins has very recently completed, in which the steam, after having operated upon the piston of a small cylinder, and escaped through the enlarged end of it, enters another cylinder of greater magnitude, where the steam acting with diminished force drives the piston of the large cylinder down, and in so doing it also forces down the piston in the small cylinder, owing to the rods of both pistons being connected together: the steam is thus made to bring back the piston in the smaller or working cylinder, instead of that effect being produced wholly by the momentum of the fly-wheel. We shall take an early opportunity of giving a sketch of this engine, with the details.]—EDIT.

PAUL PRY'S SPECTACLES.

The Patented Invention of A. A. DE LA COURT, ESQ. of Great Winchester Street. *Enrolled, November*, 1826.

IN exercising our calling of announcing and describing new patent inventions and discoveries, it is usually attended with the most satisfactory feelings; but, alas! this subject has excited in us the most *painful apprehensions*: for in our occasional perambulations through the crowded streets of this metropolis, engaged sometimes in deep thought, we have been saluted, in no friendly manner, by the stentorian voice of a fellow traveller, peremptorily demanding the information if we could not *see before us*; now as this inquiry has frequently been made, and always to our great mortification, we naturally feel alarm at finding a probability of another great faculty being required of us, by the general introduction of the spectacles of Mr. A. de la Court, who, had he simply enabled his majesty's subjects to see clearly *before* them, should have received our most decided support; but not satisfied with this fair and legitimate application of their optics, he undertakes to enable them to see clearly every object *behind* them. Against this invention, therefore, we do solemnly enter our protest; for our troubles hitherto have been so great from not seeing *before* us, that a lunatic asylum must be our fate, if our ears are to be annoyed with the additional inquiry "can't you see *behind* you, stupid."

But every evil, moralists tell us, is attended with some good, so this invention, notwithstanding all the calamities that we fear will result to us, may not be wholly without its advantages to others. Those persons, for instance, who are in fear of bailiffs, may keep



those troublesome fellows at a convenient distance. The frequenters of gambling tables may, by these spectacles, be enabled to observe accurately the signs given by a confederate. Pickpockets may thus be furnished with the means of eluding the police, and all sorts of thieves may carry on their depredations with double security. All the Paul Prys in the kingdom (and they are a very numerous family), will of course hail this invention with transport. In short, all those who are dissatisfied with what is passing before their faces, may be gratified in beholding the antics that are practised behind them.

After all, however, we are no friends to this invention, and such is our regard for our readers, that were we not sure they were all honest men, who wish to see the way they look, we certainly would not describe it in our work, which we will now do in just one hundredth part of the words contained in the enrolled specification of the patent, and in about as many as there are figures in the drawings attached to it.

Now know ye, therefore, in compliance with the said proviso, that the aforesaid invention doth consist, in fixing to the joints of the bows of spectacles, *a pair of mirrors*, or it may be merely to bows without the spectacle glasses (in ordinary), in the manner we have thought proper to illustrate this great optical discovery, in the above sketch of a well known perambulator of the streets of London.

PATENT MODE OF REFINING SUGAR.

By Charles Freund, of Spitalfields. *Enrolled January*, 1827.

This is a process for clarifying sugar by the employment of pearl ashes in conjunction with fullers' earth, in lieu of bullocks' blood, or other albuminous matters.

Sixteen pounds of pearl ashes are first dissolved in the boiler pan in 84 gallons of water, to which is added 18 cwt. of raw sugar: when this has become smooth, about 25 pounds of fullers' earth, previously mixed with water to the consistence of cream, is to be thrown in, and the whole well stirred up from time to time; the boiling is to be occasionally suspended for taking off the scum, and when the liquid has become clear, it is to be emptied into a vessel, provided with three cocks at different elevations, and mounted upon a frame adapted for tilting it, which therefore rests centrically upon an axis, one end of the frame being elevated or depressed at pleasure by means of a screw. When the first portion of the liquid has become clear, (which is usually in about twelve hours), it is to be drawn off by the upper cock, and the lower portions, when they have also become clear, by the other cocks; to draw off the remainder at the bottom clear from the sediment, the vessel is now to be gradually tilted by means of the screw, allowing it to flow only as long as it runs off quite clear. The thick syrup and sediment is finally removed by the withdrawing of a plug at the bottom of the vessel, which, with the former skimmings, is clarified by subjecting it to a repetition of the process already described.

PATENT ARTIFICIAL FUEL.

By Levi Zachariah, Jun. of Portsea.—*Enrolled November*, 1826.

This artificial fuel is a combination of such substances only as are separately of little or no value. The materials proposed to be used are, exhausted dye woods, tanners' spent bark, saw-dust, &c.; these are to be mixed with pulverized cinders, ashes, clay, broken bricks, horse dung, &c. in various proportions, and made into a stiff paste with water; after which the mixture is to be formed into lumps, and the lumps dipped in coal tar, grease, or other oily or bituminous fluids in a boiling state; the lumps thus prepared are, when dry, fit for use. As the proportions of these substances may of course be varied almost infinitely, the patentee gives the following directions for forming a good artificial coal.

Take one-fourth part of dung; one-fourth of saw-dust, or of the exhausted wood and bark before-mentioned; one-fourth of ashes; and one-fourth of mud: form the mixture into lumps, and dry them in the air, or in a kiln or stove; then steep them for a few minutes in coal tar, and dry them again for use.

A very economical and good burning fuel may no doubt be thus formed, but we think, for ordinary domestic use in open stoves, the exhalations from some of these materials would be found inconvenient: certain obvious alterations in the constituents and their proportions would, however, lessen or prevent this inconvenience.

Had Mr. Zachariah read our 57th number, page 133, vol. iii. he would there have seen that Mr. Sunderland, of Croom's Hill, Blackheath, had patented precisely the same composition two years before. The want of this information, which he might have purchased for four-pence, has therefore caused him a loss of some hundreds of

pounds. This fact, which is by no means rare, affords a better proof than any argument of the utility that this work may be to those who read it.

PATENT CAR AND RAILWAY.

For Crossing over Rivers and Valleys, by Robert Midgley, of Hosforth, near Leeds. *Enrolled Nov.* 1826.

There is no drawing attached to this specification, and the information is too indefinite to afford a clear comprehension of the patentee's views; but as far as we do comprehend it, it bears a close analogy to a plan publicly proposed and talked of, for crossing the River Thames, near the present site, and previous to the erection, of the Southwark Iron Bridge. An elevated platform or car, surrounded with railing, supported upon legs, and strongly braced in diagonal directions, is to be constructed, having wheels beneath it, which are to run in a double railway laid in the bed of the river, or on the surface of a valley, for the transportation of passengers and goods. The car is to be drawn across by a rope or chain fixed to the opposite shores (in such a manner as to offer no obstruction to craft), which is to be worked by a windlass, or other suitable machine, for winding the chain on board the car; or by fastening the chain to the car, the impulse may be given by machinery on the land.

By another modification, it is proposed that the railway shall have a toothed rack, into which a pinion on the framing of the car shall take, and be worked by a suitable power carried with it. The height of the vehicle to be the same as the landing places. To clear the railway of weeds, mud, and other obstructions, a kind of plough is to be fixed to the lower part of the framing of the car at each end.

PATENT PROCESS FOR PURIFYING SMUTTY WHEAT

By Thomas Hughes, Miller, of Newbury. *Enrolled, Nov.* 1826.

This process is valuable, inasmuch as it may be easily practised by any body; it is as follows. The smutty wheat is first to be washed by immersion in a tub of water, agitating it briskly, and changing the water as often as may be necessary; the particles of the smut, and the decayed grain, float on the surface of the water, and may be removed by skimming. The operation of washing should be performed as quickly as possible, to prevent the grain from imbibing much moisture. The corn is then to be drained in a basket or coarse bag, and when it ceases to drip, it is to be spread out in quantity about one or two bushels at a time, in a large wide trough, with a cloth at the bottom, where it is to be well rubbed with other cloths, to dry and clean it from any adhering smut; the cloths should be a little damp, by which they the more readily take up the smut. As soon as the grain is rendered thoroughly clean by this operation, it is to be dried in the sun and air, or in a stove slightly heated, when it is to be stored for consumption.

The whole process from beginning to end should not occupy more than an hour, in which time an active person may completely clean two sacks of wheat. The bottom of the trough should be of open work, formed of battens or laths, with interstices between, to allow the escape of moisture, and the absorption of it by the air.

In some cases, a quantity of bran or pollard may be mixed with the wet corn, to abstract the moisture; the bran may be separated by screening after it has been dried.

COMPARATIVE VIEW OF

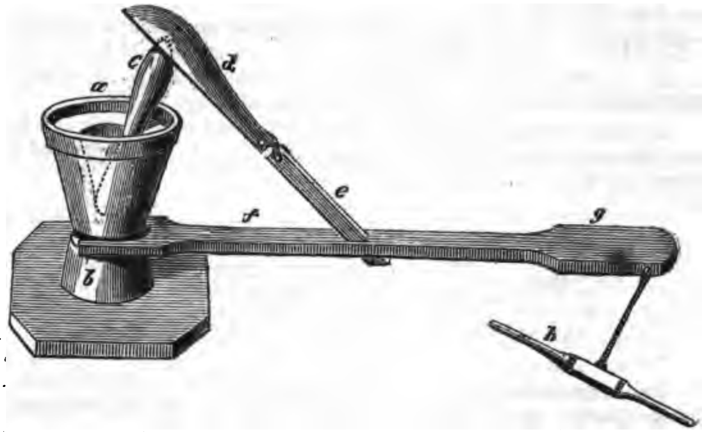
FOREIGN AND BRITISH MACHINERY, AND PROCESSES IN THE ARTS.

CEYLON. N°. V.—[Continued from page 127.]

In our last paper under this head we described and referred to several improved machines for the expression of oil, with the assistance of heat. In the succeeding number we also described (though not under the above heading) two excellent machines applicable to the same purpose: the first of which, Christie's Mill for Crushing Oats, &c. page 136, is equally adapted to the crushing of oleaginous seeds, and similar substances, preparatory to the material being put into bags, and subjected to the operation of a regular oil mill. The other machine alluded to, is Blythe's improved Blubber Press, p. 138, which forms also a very powerful and compact apparatus for the expression of vegetable oils. With these remarks we intended to have concluded the subject of oil-pressing as respects the island of Ceylon, and to have proceeded to the consideration of the Singalese method of conducting the process of distillation; but we have been recently informed that the native Oil Press, described by us at p. 107, is not as, we suspected, the only oil press used by the Singalese, but that the apparatus employed at Madras, and other parts of the peninsula, have been introduced into Ceylon, where it is much used by the oil makers. This machine is large and substantial, but from the injudicious arrangement of the parts, there is but little work done, when the manual labour and animal force employed to give it effect are considered. Our drawing of the subject is taken from a model recently brought over from India, by a member of the Asiatic Society, in whose Museum it is deposited, and where we were kindly permitted to take our sketch.

THE SINGALESE & HINDOOSTANEE OIL MILL.

The mortar *a* is about six feet high, and is usually formed of a block of granite, but sometimes of wood; in both cases there is as much of the substance sunk into the ground as remains above it: *c* is a pestle, the upper extremity of which fits loosely in the piece of timber *d*; at *e* is another piece of timber attached by cords to *d*, (by passing round the projecting pins shown) with its lower end morticed and bolted to the horizontal lever *g*; one of the ends of this lever is forked, as at *f*, so as to pass into and around a groove made in the mortar; the lower part *b* of the mortar, enlarged in its dimensions,



serves as a rest for the lever g, and to give steadiness to the apparatus.

To put this machine into operation, a man sits upon the end g of the horizontal lever, which by the connecting bars e and d causes the pestle c to press hard against the sides of the mortar, and a circular motion is given to the pestle, by attaching a pair of oxen to the yoke h, who draw it round.

An oil press on the same principle as this, but more complex and inconvenient, is described by Dr. Buchanan,* as being used by the oil-makers of Bangalore, for expressing various kinds of oil. These mills receive a quantity of seed, equal to about 2½ of our Winchester bushels, to which in the course of grinding about 2¼ quarts of water are gradually added. The grinding continues for six hours, when the farinaceous parts of the seed and the water form a cake; and this having been removed, the oil (about 5½ gallons in quantity) is found clean and pure in the bottom of the mortar, from whence it is taken by a cup. The mill requires the labour of two men and four oxen, and grinds twice a day. The oxen are fed entirely on straw, and are allowed none of the cake, which is sometimes dressed with greens and fruits into curry, and at others given to milch cattle.

We shall proceed to Distillation in our next.

SCIENTIFIC INSTITUTIONS.

Royal Institution.—Monday, Oct. 1, Dr. Gordon delivered a Lecture introductory to his extensive Course on *Medical Jurisprudence or State Medicine,* which was then deferred till the 15th of October.

The introductory Lecture to Professor Brande's and Mr. Faraday's extensive and practical Course of Lectures and Demonstrations

* Journey from Madras through Mysore, Canara and Malabar, vol. 1, p. 228.

on Chemistry, in the laboratory of the Institution, will be delivered on Tuesday, the 9th October.

WESTERN LITERARY AND SCIENTIFIC INSTITUTION.—Professor MILLINGTON has just concluded his Course of Lectures *on Pneumatics*.

LONDON MECHANICS' INSTITUTION.—On Wednesday, the 10th, Mr. WALLIS is to deliver the first of his double Course of Six Lectures *on Astronomy*; which will be continued every succeeding Friday and Wednesday for six weeks.

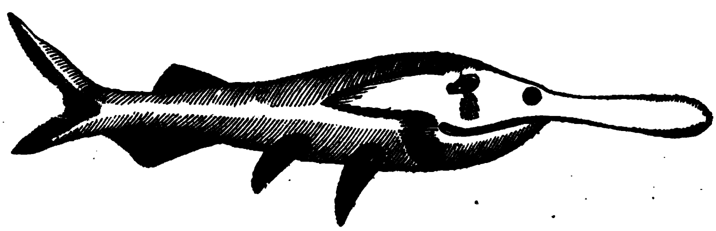
N. B.—Each of these Lectures is given twice, on the Wednesday and Friday of each week, in order that all the members and their friends may have an opportunity of attending those impressive discourses, which are illustrated throughout by splendid transparencies, exhibiting various phenomena, and the motions of the heavenly bodies.

THEATRE IN GUY'S HOSPITAL.—On Thursday, the 1st November, at six o'clock in the evening, the first of an annual Course of Twenty-six Lectures *on the various Branches of Experimental Philosophy*; the first thirteen of which will be delivered by Professor MILLINGTON, the others by Mr. ALEXANDER BARRY. These Lectures will be continued on every succeeding Thursday at the same hour.

Natural History.

THE SPOONBILL STURGEON, OR PADDLE FISH OF THE OHIO, is considered to be peculiar to the western waters of North America, and very rare even in those regions; a description of it has been sent to Dr. Silliman, and is inserted in the last number of the American Journal of Science, just received, from which we have prepared the following *abbreviated* description of the subject, referring the more profound of our ichthyological readers, to the *full* account given in Dr. Silliman's Journal.

The popular name is the paddle fish. It is known by some ichthyologists by the name of spatularia, but the dominant and modern term is polyodon, from the existence of many small teeth in the throat. There is but a single species to the genus, and is only to be found in the waters of the Mississippi, and tributary streams. The specimen delineated above, was caught in a net near Marietta, Ohio; the whole length is 5 feet, weight 40 pounds. The length of the spatula or nose 13 inches; width at the broadest part 3½ inches;



from the eyes to the back of the gills 10½; from the gills to the pectoral fins 3 inches; from the gills to the tail 3 feet. Back and sides a light slate colour, spotted with black; belly white; skin smooth, like an eel; the flesh compact and firm, and hard when boiled—not very enticing to the epicure.

The jaws are without teeth; but the fauces are lined with several tissues of the most beautiful net-work, evidently for the purpose of collecting its food from the water, by straining, or passing it through these ciliary membranes, in the same manner as practised by the spermaceti whale. Near the top of the head are two small holes; from their open appearance, and apparent communication with the fauces, or back of the mouth, it is possible he may discharge the water through them, in the manner practised by cetaceous animals. It is conjectured the long nose of this fish is for digging up or moving the soft mud in the bottom of the river, and when the water is fully saturated, draw it through the filamentous strainers in search of food.

Petrifying Spring.—At the northern base of the hill upon which Clermont is built, rises a spring, the water of which is impregnated by means of its carbonic acid with so large a portion of carbonate of lime (which it deposits on issuing into the air that its incrustations have formed an elevated natural aqueduct 240 ft. in length, and terminating in an arch thrown across the stream it originally flowed into, 16 ft. high, and 12 wide. Near it are the rudiments of a similar arch, the construction of which is still going on. The spring is turned to a source of profit by the proprietor, who breaks the fall of the water in such a manner that its stony particles may be deposited on various natural objects exposed to its spray. At the time of my visit the stuffed skins of a horse and a cow were undergoing this petrifying process, together with varieties of birds, fruit, flowers, &c.—*Scrope's Memoir on the Geology of Central France.*

The Rose of Jericho.—This singular plant, which is found only in the deserts of Arabia, resembles no other in the world. It is about six inches high, root and all. Its iny branches, which are extremely hard, give it the appearance of a Lilliputian tree. When drawn from the earth and allowed to dry, the points of its branches curve inward, until they touch in one common centre. Within the hollow globe thus formed, its numerous flowers are enclosed, which is partly the case while the plant is in its natural state.—*Weekly Review.*

Marine Fans.—In the Red Sea, and some parts of the coast of America, there grows a very curious marine plant, which is flat, and spreads very much like a peacock's feather. Its colour in general is tawny, but some are found of a very fine olive. It is formed of innumerable ligneous fibres interwoven together, and is as supple and tough as whalebone. They are sometimes found 18 inches long in the Red Sea; and are eagerly sought by the women of America for fans. In some few instances, these plants are found of a very beautiful red, or variegated, when of course their value is greatly increased.—*Ibid.*

Chemistry, Medicine, &c.

Method of preparing Denarcotised Laudanum, by Dr. Robert Hare.—Agreeably to the observations of the French chemists and physicians, the unpleasant effects of opium reside in a principle called narcotine, and Robiquet has informed us, that by digestion in ether, the drug may be depurated of that noxious principle. It struck me, as soon as I became acquainted with the statement of Robiquet, that it was of the utmost importance to humanity to have it tested, and the result made known to my countrymen if favourable.

Some opium, shaved by rubbing it on the face of a jack plane, was subjected four times successively, to as much ether, of the specific gravity of .735, as would cover it, allowing each portion to act upon it for about 24 hours. The opium was afterwards subjected to as much duly diluted alcohol as would have been adequate to convert it into laudanum of the common kind, had it not been subjected to ether. In the ether which had been digested on the opium, a deposition of crystalline matter soon commenced. The stopple being removed, and the mouth of the containing vessel (in this case a common French tincture bottle), being covered with blotting paper, in a few days nearly the whole of the liquid evaporated spontaneously, leaving much crystalline matter mixed with colouring matter. The former is no doubt the principle distinguished by Robiquet, since called narcotine. The digestion of the opium with the ether, is conveniently performed in Papin's digesters—the ether should be kept near the temperature of ebullition.

The first use which was made of the denarcotised laudanum, was by way of an enema of 30 drops, in the case of a child, tortured with ascarides, to whom it gave early relief, inducing a comfortable and apparently natural sleep, and causing subsequently no unpleasant symptoms. The next instance was a case of severe head-ache, which was relieved in 30 minutes, by ten drops taken into the stomach; a refreshing slumber succeeding.

To this paper, Dr. Hare has appended several cases sent to him by Mr. W. P. Dewees, a medical practitioner, in all of which the denarcotised laudanum was attended with very favourable results, from which Mr. Dewees is led to anticipate that the great desideratum in the use of opium is obtained.—*Silliman's Journal.*

An easy way of obtaining Meconic Acid, by Robert Hare, M. D. &c.—If to an aqueous infusion of opium we add sub-acetate of lead, a copious precipitation of meconate of lead ensues. This being collected by a filter, and exposed to sulphuretted hydrogen, meconic acid is liberated. The solution is of a reddish amber colour, and furnishes, by evaporation, chrystals of the same hue. A very small quantity produces a very striking effect in reddening solutions of peroxide of iron.

Instead of sulphuretted hydrogen, sulphuric acid may be used to liberate the meconic acid. The presence of the former in excess, does not seem to interfere with the power of reddening ferruginous

solutions. But any excess of sulphuric acid may be removed by whiting, which is not acted upon sensibly by meconic acid; yet the acid procured in this way did not chrystallize so handsomely, or with so much facility, as that obtained by sulphuretted hydrogen.—*Silliman's Journal.*

Sulphate of Quinina.—According to the account of M. M. Pelletier and Aventou, the large quantity of 90,000 ounces of sulphate of quinina, was manufactured in 1826, in France; a quantity which could not have been administered to less than 1,444,000 persons.

Patent German Black Dye and Ink.—The following is a process for the preparation of a black dye, for which a patent was obtained at Vienna by Mr. Honig. Logwood is to be boiled several times in water, and a little sub-carbonate of potash to be added to the decoctions, the quantity to be so moderated that it shall not change the colour to blue: the stuff to be dyed is then to be plunged into this bath. This stuff may be either animal or vegetable. When it is impregnated with colouring matter, it is to be withdrawn, and without being exposed to the air, is to be introduced into a solution of green vitriol, and left there until it has obtained the desired black hue. In preparing the ink, the decoction of logwood is used in place of the infusion of galls.

Botany.

The Pepper Plant—is a species of vine, which twines round the trees in the vicinity, especially the mango: the leaf is pungent and aromatic, and the berries grow in clusters, like currants, close to the stalks. When ripe, the berries are gathered, and before being dried, are steeped in warm water, in order to preserve them from insects.

Useful Arts.

A Cheap and Excellent Stucco has been lately introduced into France, founded upon the observation, that a mixture of lime and alum produce a hard and durable cement. The sulphuric acid of the alum is evidently of no advantage, but the basis alumine, or pure clay, is the body that confers the hardness and tenacity to the composition. Accordingly the preparation has been economized in the following manner.

One hundred parts of quick lime are to be slacked by degrees, until reduced to the consistence of cream; five parts of white clay, previously diluted with water to a similar consistence, are then to be intimately mixed with the lime, and allowed to stand in a tub, or other vessel, for 24 hours, occasionally stirring it up. Any kind of colour may now be communicated; but two parts of yellow ochre added to the mixture, is found to give it an agreeable and durable tint. The walls of some buildings, much exposed to wind and rain, were covered with this cement two years ago, which are not in the least deteriorated.

Printing in Oil Colours Copies of Oil Paintings.—In a recent number we echoed a report that Senefelder, the inventor of lithographic printing, had discovered a method of multiplying perfect copies of oil paintings, by printing impressions from the original, upon the truth of which to the extent mentioned we expressed our scepticism, and gave our reasons thereupon; we now find by a recent number of the Bulletin des Sciences, that the pigments are prepared with a basis of oil and wax, and that they are to be laid *a line in thickness*, in order to get a hundred impressions, and *an inch in thickness* for a thousand, and still thicker for a greater number!

Notwithstanding this circumstance, the process of preparing a plate of the kind is said not to occupy more time than making an ordinary oil painting, and that very little skill is required in the performance. The paper is damped, and perfect impressions taken upon it with a very slight pressure; the pictures thus obtained are then laid over canvass, with a coat of varnish as a cement between, and, finally, the surfaces are washed over with a solution of alum.

Pure Standing Water.—We have heard it asserted on respectable authority, that a due proportion of that fragrant shrub *bog myrtle*, left to steep in pure water, will preserve that element sweet and incorruptible for any length of time. We are also told, that this antiseptic quality was discovered by a late highly-respectable and intelligent gentleman of this county, who proved it experimentally, by preserving a cask of water perfectly pure and without taint, for four months.—*Cork Southern Reporter*.

Aerostation.

In some critical remarks on Mr. Genet's extraordinary propositions for aerial travelling, by means of a self-created force, Dr. Silliman makes the following eloquent and liberal appeal in favour of giving them a fair trial.

"Let him (M. Genet) be heard, although he may utter some things new and strange. He who was the companion, pupil, and friend, of many of the great men both in France and England, who during the latter part of the late century illuminated the world with the most splendid discoveries, directed and rectified by the severest logic of science, and who himself exhibits a vigorous and cultivated intellect, ought not to be dismissed with a sneer.

"It is easy to ridicule balloons, and pert and brilliant things may be said about them, with little trouble and as little merit. Horace, in a beautiful ode to the safety of his friend Virgil, about to sail for Athens, inveighs against the temerity of that man who first presumed to tempt the gods by venturing to sea. What (possessed of as much poetry and no more philosophy) would he have said, had he lived in our days, and could he have seen Captain Hastings or Lord Cochrane, dashing through the Mediterranean in a steam boat of war; a frail machine composed of the most combustible materials, urged forward by a fierce internal heat, groaning like the fires of Ætna, imprisoning a power more tremendous than the winds, but defying both the winds and waves, and bearing along the thunders and the bolts of Jove!

He would have cursed the audacious adventurers by all his gods! Could he have seen balloons actually rising in the atmosphere, till they became invisible—transporting the äeronauts "swift as the winds along," or anchored aloft for months, and used by a corps of äeronautic engineers,* and then descending in safety to the earth, he would have thought them little less than gods, and would probably have changed his curse into an ode of deification.

"If science has, then, often achieved what would have been thought incredible, let not her efforts be stinted for want of those means which an opulent country can easily supply. There is a wide difference between attempting that which is absurd and that which is only difficult. Perpetual motion is an absurdity, but it involves no absurdity to attempt to rise in the atmosphere, or to attempt to steer our way when we have arrived there. The latter is confessedly very difficult, perhaps impracticable, but it is not absurd.

"Were the bulk of a balloon small, and the wings that might be used large, it would resemble a bird; but as the contrary is the fact, the difficulty is enhanced in a corresponding degree. But let the experiment be made. The thousands which in great cities are squandered upon amusements, would be much better appropriated in this manner, and when it is fully ascertained that balloons cannot be navigated by any practical means, then let them remain as now, a brilliant but imposing spectacle, auxiliary to amusement, war, and philosophy, but the sport of the careering winds and tempests of heaven. We conclude by wishing Mr. Genet ample success. Failure will involve no disgrace; but success would add another brilliant leaf to the book of discovery."

Geography.

Map of European Turkey.—M. Lameau, a French engineer of the greatest eminence, has just published a map of the European portion of the Ottoman Empire. It contains as well the ancient as the modern names of places, and must therefore prove of extraordinary utility to the students of classical literature.—*London Weekly Review.*

A New General Atlas of 51 Maps, engraved by Sidney Hall.—The many discoveries of recent travellers, and the great changes of territorial boundaries in many parts of the globe, seem to render such a work a desideratum.

Geology.

Zealand and Flanders.—In carrying on some extensive works in the great basin and sluices at Torneuzen, there has been found, 24 feet below the level of the sea dike, a stratum of turf, with oak, alder, and other wood, embedded in it. This seems to indicate that Zealand and Flanders were formerly united.

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* As was done in France during the Revolution, when a regular school of äeronauts, under a colonel of that department, was established for warlike purposes; a certain number of pupils being daily exercised aloft in the atmosphere.

Horticulure.

PRESERVATION OF APPLES.—The following observations contained in a letter from Noah Webster, Esq. have been published in the Massachusetts Agricultural Repository.

"It is the practice with some persons to pick apples in October, and first spread them on the floor of an upper room. This practice is said to render apples more durable by drying them. But I can affirm this to be a mistake. Apples after remaining as long on the trees as safety from the frost will admit, should be taken directly from the trees, to close casks, and kept as dry as possible. If suffered to lie on the floor for weeks, they wither and lose their flavour, without acquiring any additional durability. The best mode of preserving apples for spring use, I have found to be, the putting them into dry sand as soon as picked. For this purpose I dry sand in the heat of the summer; and late in October, put down the apples in layers, with a covering of sand upon each layer. The singular advantages of this mode of treatment are these: 1st, the sand keeps the apples from the air, which is essential to their preservation. 2d, the sand checks the evaporation from the apples, and thus preserves their full flavour—at the same time any moisture yielded by the apples, (and some there will be,) is absorbed by the sand; so that apples are kept dry, and all mustiness is prevented. My pippins, in May and June, are as fresh as when first picked; even the ends of the stem look as if just separated from the twig."

Population.

WIRTEMBERG.—It appears that this kingdom is, in proportion to its surface, the most populous in the world. On the 1st of November, 1826, it counted 1,517,770 inhabitants, that is to say, 740,324 males, and 777,446 females. At the same period of the preceding year, its population was only 1,505,720, so that in one year the population increased by 12,050: it now contains about 4245 inhabitants to each square mile.

Statistics.

EXAMPLE OF AMERICAN PROSPERITY.—A pamphlet has lately been published at Cincinnati, U. S. entitled "Cincinnati in 1826," by which we are informed that the first settlement was in 1788. The population did not increase, however, with rapidity till 1805, when it had scarcely attained the importance of a large village. A considerable number of emigrants then came out from Baltimore and other eastern places; and from that time to the present its growth and consequent prosperity have been remarkable, even in this astonishing age and country.

In 1810 the population was 2320,—1813, 4000,—1819, 10,823, —1824, 12,016,—1826, 16,230!

It is estimated that 800 persons are employed in trade and mercantile pursuits; 500 in navigation (of the Ohio we presume); and about 3000 *in manufactures!*

The manufacturing establishments are about 400 in number. We

observe in the interesting detail of them no less than *five steam engine factories*, employing 126 hands, and *three steam-boat yards*, employing 200 hands; and that one of the "steam mills," the largest, is described as a substantial stone building, based upon the limestone rocks of the river, 62 by 87 feet, eight stories high on the end next to the river, and measuring 110 *feet* from the base to the top of the roof. It has 24 doors and 90 windows: it required in its construction 6620 perches of stone; 90,000 bricks; 14,000 bushels of lime; and 81,200 cubic feet of timber. It contains a manufactory of flour, a distillery, and a fulling mill, the machinery of which is driven by a steam engine of 70-horse power.

Mineralogy.

CALAMINE IN MISSOURI.—Messrs. Troost and Lesoeur have discovered in Jefferson county, at a place called Vales Diggings, the carbonate of zinc in great abundance. * * * * It is also stated that the country to the south-west of Lake Superior abounds in copper, found in an oxide rich in native copper. Now these two substances, zinc and copper, which are the constituents of brass, are at present imported from foreign countries. The copper ore could be brought down the Missisippi without undergoing any preparation to an establishment near the mines of the zinc, where the brass could be manufactured, and would give an additional value to the lead mines in the same district, by this important branch of industry.—*New Harmony Gazette.*

LIST OF NEW PATENTS,

Sealed 1827.

PAPER MAKING.—To Gabriel de Soras, of Leicester Square, and J. & C. Wise of Maidstone, for certain improvements in sizing, glazing, or beautifying the materials employed in the manufacture of paper, pasteboard, &c. To be enrolled by 21st Feb. 1828.

CRANES.—To John Hague, of Cable Street, Wellclose Square, for a new method of working cranes or tilt hammers. To be enrolled by 30th Oct. 1827.

BLIND PULLIES.—To Benjamin M. Coombs, of Birmingham, for additions to a pulley machinery and apparatus, used and applied for securing, fixing, and moving curtain, roller, and other blinds. To be enrolled by 30th Oct. 1827.

PIANO-FORTES.—To William Detmer, of Upper Marylebone Street, Fitzroy Square, for certain improvements on piano-fortes. To be enrolled by 29th Feb. 1827.

BRIDLE BITS.—To W. J. Ford, of Mildenhall, Suffolk, for certain improvements in the make, use, and application of bridle bits. To be enrolled by the 6th Nov. 1827.

PRINTING.—To George Clymer, of Finsbury Street, Finsbury Square, for an improvement in typographic printing, between plain or flat surfaces. To be enrolled by the 6th March, 1828.

TO OUR READERS AND CORRESPONDENTS.

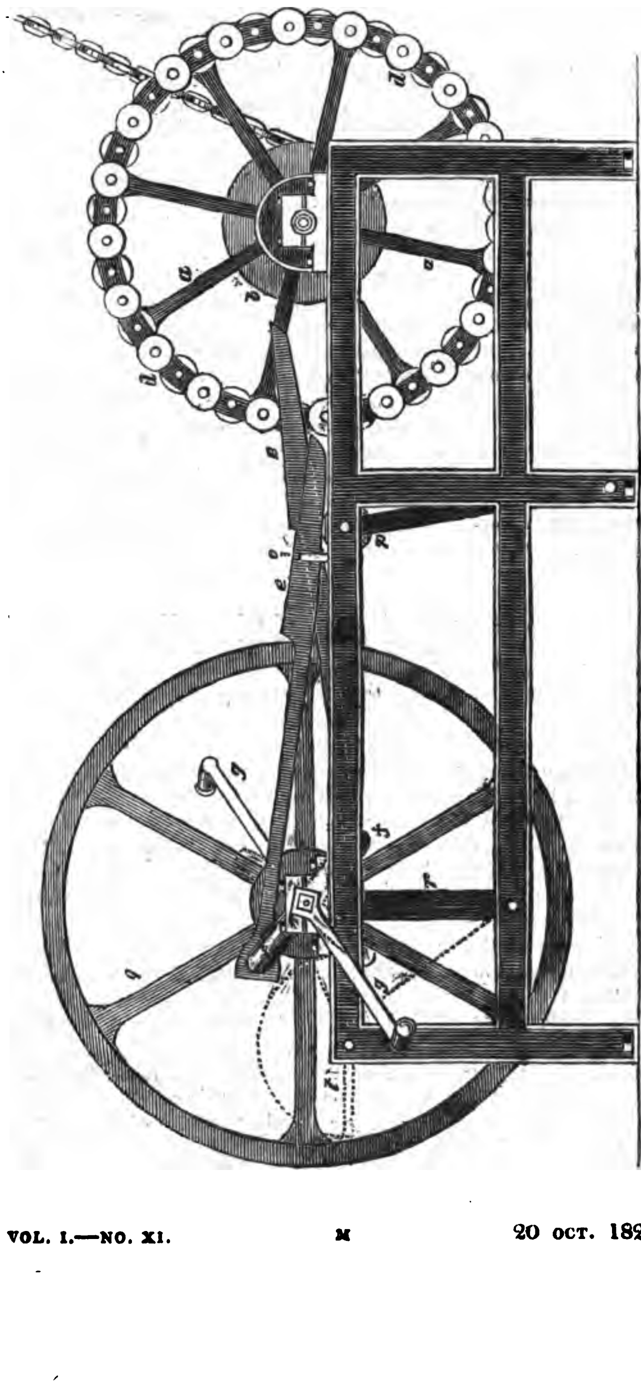
T. M.'s improved hydro-pneumatic oil lamp is intended for insertion in our next.

Mr. CHARLES RICKETS's improved kitchen range, will also appear in our next.

A. B—Y's letter we cannot fully understand, and as parts of it are illegible it cannot be printed. How is it that so excellent a draftsman contrives to draw the letters of the alphabet so badly?

AN ENQUIRER will find a full description of the London Portable Gas Works in our 59th Number; it has appeared in no other work.

W. W. is informed, that we purpose inserting in our next, a description of a chaff-cutting machine, very superior to that which he points out to our notice.



WRIGHT'S NEW PATENT CRANE.

NEW PATENT CRANE.

By Mr. SAMUEL WILLMAN WRIGHT, of Lamboth.—Sealed August, 1827. *(not yet enrolled.)*

SOME injudicious friends of Mr. S. W. Wright having reported this machine as a wonder working affair, and trumpeted it to the world in a monthly publication that it was "*without either wheel or pinion,*" and that it acted solely by wedges and levers, we were naturally very anxious to lay before our readers so curious and novel a contrivance; more especially as it was also very learnedly observed in the mysterious published notice of it, that notwithstanding the old-established axiom, that "*power can only be increased at the expence of velocity,*" that "*this crane does actually raise heavy weights with less than half the power of the best constructed cranes heretofore used, and with the same or even greater velocity.*" To see a machine capable of doing this, we would with pleasure have walked to the Land's-end, but we had, fortunately, only to go as far as the West India Docks, where one or two of them, we were informed, had been sent on trial. On arriving there and making the necessary inquiries we were shown a machine similar to that represented on the other side, upon which we observed to our guide that that could not be the machine we were seeking for, as it possessed no less than *a hundred* wheels, while the one we wanted to see had *no wheel at all:* he assured us it was Mr. Wright's new patent crane, and that it was distinguished in the docks by the appellation of "the wheel of wheels," on account of its containing so many!

As the arrangement of the parts of this machine was quite clear to us, we trusted to our memory in making the prefixed diagram, which may nevertheless be depended on as strictly correct in every essential particular; to prevent confusion by a multiplication of the same parts we have only shown one side of it, the opposite side being similar; there being two wheels of wheels, and four inclined planes, with their necessary subordinate contrivances: we have also left out the friction band, that being the same as in other cranes, and as it obstructed the view of the more important and novel parts.

The figure is a side elevation. *a* is the principal wheel, fixed to and revolving with the chain barrel *b* on the axis *c;* the periphery of the wheel *a* is made perfectly flat on both sides, for the reception of the numerous small wheels *d,* alternately placed on the opposite sides of the ring, with their axes fixed into it: these (which may be called friction wheels) are solid, about an inch thick, and five inches in diameter; they are turned smooth and made bright in all parts; and are seemingly employed in lieu of teeth or cogs, with the view of reducing the friction; to give motion to the wheel *a,* the winches *g g* are turned by manual labour, on the axis of which is the fly wheel *q,* and a four-throw crank *f f;* to the arms of this crank are connected the inclined planes or wedges *e e,* (only two of which are shown) which by the revolution of the crank are successively projected against the under sides of the peripheries of the small wheels *d,* from whence they are by the continued revolution again withdrawn, and again

projected, under the next little wheel below the former, each wheel being raised by running on the inclined plane, as the latter is thrust under it.

It should here be understood that there is another wheel of wheels on the other side of the chain barrel *b*, which is operated upon by two other inclined planes, (not brought into view, for the reason before mentioned) which are connected to the two other throws of the crank represented by dotted lines. To guide the inclined planes in their horizontal motion against the little wheels, they pass between vertical pins, one of which is shown at *o*, and to support the inclined planes and reduce the friction on their under sides, they each run upon a distinct wheel, as shown at *p*.

The machine (as delineated) is in gear; to put it out of gear, a locking bar *t* has to be lifted, and to be thrown into the position shown by dotted lines; when the framing *r*, which carries the heavy crank, inclined planes, and fly wheel, and turns upon the centre *s*, has to be thrown back, by which the axis of the crank moves in the arc of a circle shown by dots, to the position *n*. To put the crane into gear again all these heavy parts are to be lifted and pushed forward by main force, and it requires the utmost strength of two men to effect this.

We shall not attempt to show the absurdity of the nonsensical intimation that a power of two to one is gained by this crane without loss of time or velocity, for we are fully convinced that there is not a reader of the Register of Arts who is not well aware of the utter impossibility of gaining even the smallest quantity of power without loss of speed, by any combination of levers, wheels, screws, pulleys, inclined planes, or wedges; and that, on the contrary, power is invariably lost by increasing the number of acting parts in any compound machine.

Premising, therefore, that all improvements in cranes or other machines for accumulating the power of a first mover, when applied to a mass on which it would be ineffective without accumulation, must be in the arrangement of the acting parts, so as to diminish their friction; the judicious adaptation of the machines to the various purposes for which they are intended, so as to render them convenient in application; or their simplicity of construction and proportionate strength of different parts, so as to render them economical in manufacture; we shall proceed to compare Mr. Wright's crane with those in common use. Suppose there are 50 friction wheels on each of the main wheels of Mr. Wright's crane, four of them being raised by each revolution of the winch, it would be only equal in power to a common crane, with a pinion of 8 teeth acting on a wheel of 200 teeth, for the winch and chain barrel are the same as other cranes; or of course the same or a much greater power may be obtained by the introduction of two wheels and two pinions, and we conceive in that case the friction would be much less than in Mr. Wright's machine, with his 100 friction wheels, four cranks, and four projecting wedges. The crane in some instances, particularly that of changing it out and into gear, is far inferior to others; it affords

no means of altering the power or the velocity according to the weight to be raised; and the comparative cost of manufacture can best be ascertained by application to the patentee.

That a man of Mr. Wright's mechanical genius would have effected some real improvement was naturally to be expected; that he has produced much novelty in his crane every body will admit; and that a crane fitted up in his excellent manufactory for the purpose of showing his invention at the West India Docks, will do considerable work, no one will entertain a doubt: but we are perfectly convinced, that had the workmanship of Mr. Wright's machine been of that coarse description in which cranes are usually manufactured, it would prove far less effective in its operation than those on the simple wheel and pinion principle.

PATENT PROCESS IN MAKING IRON.

By Philip Taylor, Esq. of the City Road.—*Enrolled February*, 1826.

The patentee proposes to obviate the difficulties or disadvantages attending the smelting of iron, in situations where bituminous coal is scarce, by employing the stone coal, in conjunction with carburetted hydrogen gas, which is to be prepared in a distinct apparatus, and injected into the smelting furnace during the fusion of the metal.

To effect this, retorts are set in furnaces, the same as is usual in the illuminating gas works, charged with the bituminous coal; the gas as it is distilled, rises up vertical pipes fixed into the upper part of each retort, and enters a large horizontal tube above them, which is bent down at one extremity into a deep vessel or tank, wherein the tar is deposited; the gaseous product thus divested of the tar, and occupying the upper part of the vessel, enters another tube, which conducts it into the lime wash vessel, where it is deprived of its ammonia. Thus purified it proceeds from the wash vessel by another pipe underground, into a gasometer (or gas holder) of the usual construction. From the gasometer, the gas flows along a tube into a forcing pump, being received into the chamber of the pump by the up stroke, and by the down stroke expelled from thence with considerable force, and along another tube into the smelting furnace, where, as the hydrogen is inflamed, the carbon is absorbed by the fluid metal, producing the same quality of iron, as if the more valuable coal alone had been used. The quantity of the gas, and the degree of force with which it is to be injected upon the fluid metal, will depend upon the size of the furnace, and the quantity of iron; but this rule may in general be observed,—that where the furnace requires a blast of air from the blowing engine, to be driven by a force equal to one pound upon the inch, the force of the gas pump should be two pounds; and the gas pipe, while it enters the furnace, should be as near as possible to the orifice for the air.

By another modification of the principle of this invention, the patentee proposes to conduct oil into a blowing machine, which is to be injected in minute quantities into the furnace, with the blasts of air.

IMPROVED APPARATUS FOR SWEEPING CHIMNIES.

To the Editor.

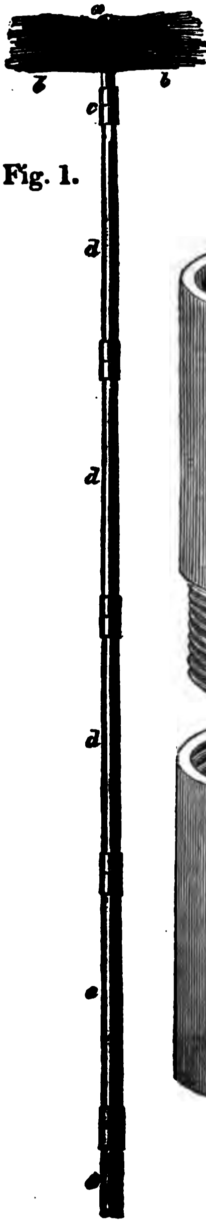
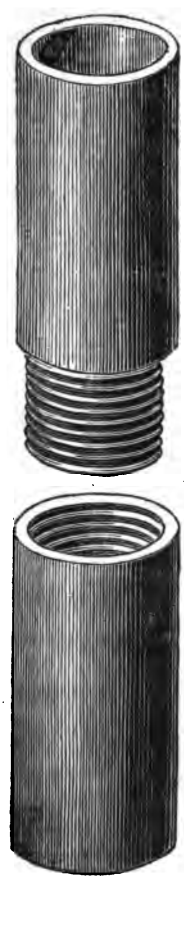


Fig. 1.

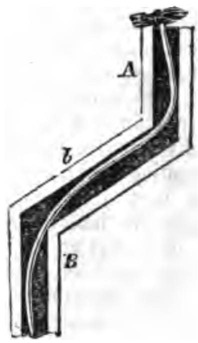
Fig. 2.



SIR,—I have just received from a very ingenious man, named Joseph Glass, an account of a machine for sweeping chimnies, lately invented by him, which for crooked and very high chimnies, appears decidedly superior to the excellent invention of Mr. Smart. Thinking that a description of it might be interesting to your readers, and at the same time highly beneficial to the cause of the poor little climbing boys, I venture to send it, not doubting but that you will devote to it a portion of your valuable scientific Miscellany.

The brush, Fig. 1, is made of a round stock *a*, commonly alder, and pierced with small holes, into which bunches, formed of strips of the best whalebone, are inserted and made fast by glue. These strips *b* are from 8 to 8½ inches in length, which renders the brush, including the stock, about 20 inches in diameter: it therefore completely fills, and consequently effectually cleanses the largest flues, which are never more than 14 inches square, and seldom more than 14 inches by 9. At the end of the stock *c*, is a very strong brass ferrule with a wormed socket, which receives the screw of the first joint *d*. Fig. 2 is a representation, in their actual size, of the ferrules. The three first portions *d d d* 2½ feet in length, are made of good cane, the rest *e e e &c.* of ground ash, and of the same length, the number used depending of course upon the height of the chimney: these

gradually become stronger towards the bottom, and are affixed to each other as the brush is forced higher up the chimney, by means of the brass screws and sockets Fig. 2, before described.



The superiority of this machine consists in its extreme pliability, lightness, and strength. It has been effectually used in crooked chimnies, where Smart's machine has not been able to pass: for instance let A be the top of a high chimney, having a diagonal portion *b*; Glass's machine introduced through B, will proceed to the top with ease, while Smart's invariably sticks at *b*. A machine has been made at Bath, somewhat on the same principle: the joints or portions, made of several slight canes twisted together, are however fastened by a small iron screw, which has been found to be too weak: the whole machine is clumsy, and is so very pliable, that the force exerted below cannot drive it up the chimney. Mr. Glass, who is a bricklayer, a manufacturer of his machines, and a cleanser of chimnies by them, has given great satisfaction to those who have employed him. He sweeps the chimnies of Lloyd's Coffee House, part of those of Somerset House, with those of several Insurance Offices, and of the first Banking Houses, &c. He is patronised by the Society for superseding the necessity of Climbing Boys, and may be highly recommended to every householder.*

Who that is not prejudiced, or whose feelings are not blunted by custom, would not employ mechanical means in place of wretched little children, who, if they survive the hardships and tortures to which in the early periods of life they are exposed, become invariably the most useless and the most abandoned members of society.

I am, Sir,
Your's, &c.
S. Woods, Jun.

Tottenham,
Sept. 28, 1827.

IMPROVED CHAFF CUTTING MACHINE.

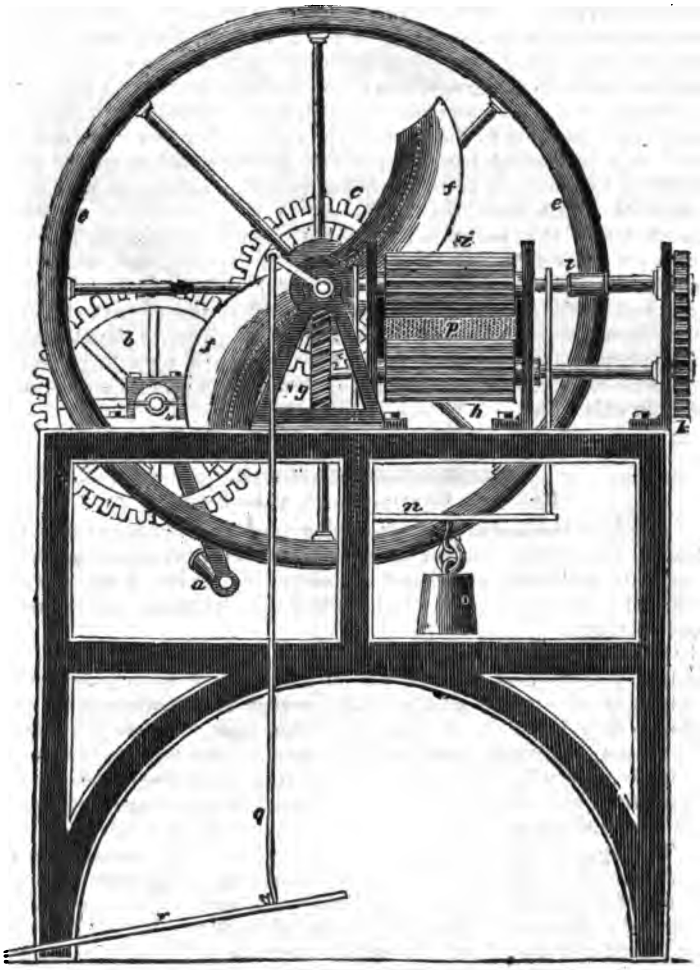
By Christie & Co., of Sheffield.

This machine* being entirely constructed of metal, of excellent workmanship, with a good arrangement of its acting parts, the friction is reduced to a trifling quantity, so that a great deal of work may be performed by it with very little labour.

The above figure represents a front elevation of the machine, which does not exhibit all the parts to advantage, but is sufficient to enable the reader to comprehend its operation with the assistance of the following explanation. The straw box and the sieve are left out of the drawing.

* He resides at No. 2, Moor Lane, Fore Street, Cripplegate.

* In the warehouse of Messrs. Wallis and Co. at the corner of Brook Street, Holborn.



a is a winch by which motion is given to the wheel *b*, and the pinion *c*; the axis of this pinion carries the fly wheel *e e*, the circular knives *f f* (bolted to strong iron arms) and an endless screw; the latter is cut upon the axis, and is not seen in the drawing. This endless screw, (by which the power is communicated, and the other motions are given, that supply the straw), turns the wheel *g*, which being upon the axis of the lower grooved feeding roller *h*, and the pinion *k*, revolve with it; and the lower pinion *k* taking into the upper pinion, the latter by its connected axis moves the upper roller *i* simultaneously with the under one; *p* represents a section of the straw under operation, which is uniformly taken hold of, compressed,

and thrust forward by the grooved rollers. The shaft of the upper pinion is provided with a coupling box at *l*, which allows the axis of the upper roller being elevated or depressed in its bearings, thus enlarging or contracting the aperture through which the straw is forced, and adapting it to any irregularity in its quantity or bulk. Pressure is given by appending to the axis of the upper roller two rods, connected by a horizontal bar *n*, to which is suspended a weight *o*. Therefore, as the straw is drawn in between the rollers, it is compressed into a firm mass, for the knives as they revolve to cut off such portion of it as protrude beyond the smooth facing of the aperture on the other side. For the protection of the workman, there is a high board fixed between the toothed wheel and the fly wheel, not introduced in the drawing, as it obstructed the view of part of the gear. In working the machine, assistance is given to the man at the winch whenever required by another workman operating upon the treadle *r*, which by the connecting rod *q* turns a small crank on the main axis.

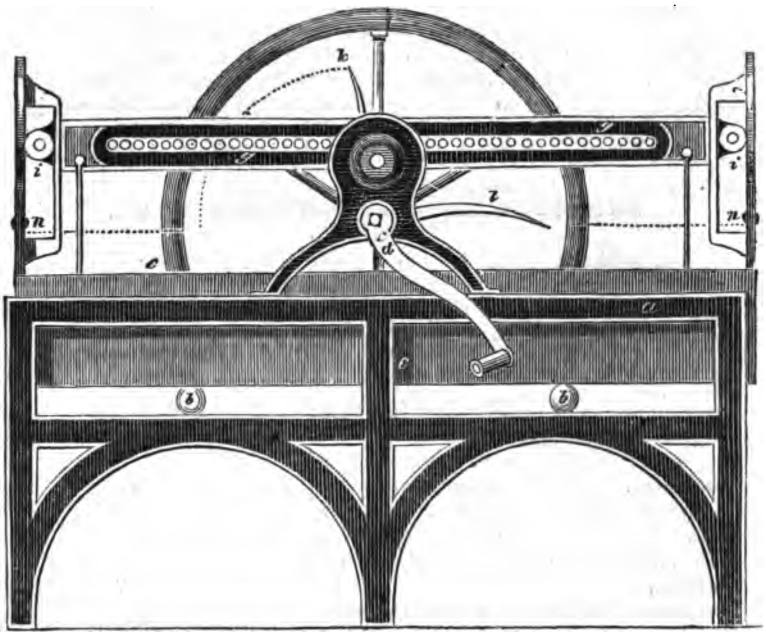
IMPROVED MANGLE.

By Messrs. Christie & Co. of Sheffield.

In making the sketch of the foregoing machine, our attention was attracted to a very excellent mangle on the same premises, manufactured by the above mentioned engineers, a drawing of which we were also permitted to take, and have now the pleasure of presenting to our readers.

"There is nothing like iron" Messrs. Christie seem to think, (and in this application of it we fully agree with them,) for this machine is also made wholly of it, except the flooring and the rollers, that come in contact with the linen, which are, for that reason, necessarily made of hard wood. This mangle has consequently a very light appearance, yet it is exceedingly solid and substantial, and its motions are the smoothest and easiest of any, that have hitherto come under our observation and trial.

The figure gives an elevation of one side of the mangle: *a a* shews one of the four sides of the cast iron frame; *b b* two wooden rollers of the ordinary kind, round which the linen to be mangled is wrapped; these rollers lie upon a floor of hard wood, and support the loaded cast iron box *c c*, which moves to and fro upon them. Motion is given to the mangle by turning the winch *d*, in the axis of which is fixed the fly wheel and a small pinion *e*; the latter is hidden by the plummer block, but the situation of it is shewn by a dotted circle; this pinion turns a toothed wheel *f* (shewn by another dotted circle); the axis of *f* carries a small toothed pinion near its farthest extremity, which is a gudgeon that revolves in the long grooved path on each side of the pinned rack *g g*, and the teeth of the pinion entering between the pins of the rack, causes the latter to move backward and forward together with the loaded box *c c*, by the continuous motion of the winch in one direction. In the above figure, the pinion is shewn as operating on the lower side of the rack,



and as the pinion does not move out of its situation, the rack is made to change its position to accommodate that circumstance; the ends of the rack therefore pass between guides, fixed to each end of the weighted box *c c*, and have small anti-friction wheels *i i* at their extremities, which run up and down the parallel bars represented. Inside the box *c* there are two weighted levers of the second class, connected, by the two vertical rods shewn, to the rack, so that when the end of the rack comes to the pinion, the rack falls and allows the pinion to roll round to the upper side, the weighted levers supporting the weight of the rack, and thereby preventing the hard rubbing of the latter against the pinion: and when the pinion has coursed the upper side of the rack, and has to descend to the under side, the weighted levers fall, and support the rack in its elevated position, as shewn. By this contrivance, (which is exceedingly simple and beautiful in itself, though difficult to describe), the alternating horizontal motion of the rack and loaded box of the mangle, takes place by the continuous rotary motion of the winch in one direction; and owing to the excellence of the workmanship, the reversing of the motion is scarcely perceptible to the hand.

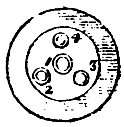
When it is desired to take out one of the linen rollers, one of the two curved bars *k l*, which turn on centres at their broadest end, is thrown down into the position of *l*; this bar so projected, then passes

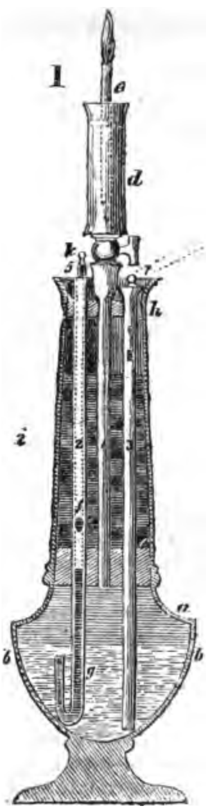
under the little roller *n*, which causes that end of the mangle to be lifted up off the linen roller, which may then be removed: in the same manner the other side of the mangle may be raised, by the horizontal projection of the curved bar *k*, which is at present shewn in the position that both curved bars are placed in, when the mangling is being proceeded with. Any person wishing for more information respecting the construction of this mangle, can consult the machine itself, at Messrs. Wallis & Co's. warehouse, in Holborn Hill.

IMPROVED HYDRO-PNEUMATIC LAMP.

To the Editor.

Fig. 2.





Sir,—Many attempts have been made to construct lamps supplied with oil, from a reservoir in the lower part of them, but with very little success. I send you the following sketch and description, of one I constructed last year, and hope you will allow it a place in your interesting publication.

a, a glass vessel forming the body of the lamp. *i*, a glass column connected with *a* by the cork *c*, which fits tightly into each, and closed at top by the cork *h*. No. 2, a glass tube descending through the two corks *h* and *c*, to the bottom of the vessel *a*, and bent upwards again as far as *g*, it communicates with *i* by the hole *f*, which may be closed by the sliding tube 5, which may also be closed by the stopper *k* at its top. No 1, a glass tube passing through the corks *h* and *c*, its lower end opening into *a*, and its upper connected by a stop cock with *d*, a glass vessel closed at top and bottom with corks. *e*, a capillary tube descending half-way down *d*. No. 3, a tube passing through *h* and *c*, and reaching to the bottom of *a*, it has two small openings into *i* in its upper part, which may be closed by the stopper *l*. No. 4, (not seen in the section, but shewn in Fig. 2, which is a plan of the tubes,) is a tube passing through *h* and *c* into the upper part of *a*. The mode of filling the lamp is as follows: close the hole *f* in No. 2, and open 1, 2, and 3, and through 5 pour quicksilver till *a* is filled to the level of the top of the bent leg *g*, then close 5 by its stopper *k*. In the top of 3 insert a bent tube (shewn by the

dotted lines) and suck the air out of *i*, when the mercury will rise in 3, pass through the holes in its upper end, will occupy the space in *i* shewn by the dotted lines. Remove the bent tube, and insert the stopper *l*, and through 4 pour water into *a* up to the line *b b*, and oil up to the cork *c*, and close No. 4, and the operation is complete. When the lamp is wanted for use, take the stopper out of No. 5, and raise 5 till the hole *f* becomes open, when the mercury will descend and pass over *g* into the bottom of *a*, forcing the oil up through No. 1 to the burner *e*, to which a light being applied, it will continue burning steadily, till the oil in *a* and the mercury in *i* are exhausted, when the lamp is to be refilled by exhausting the air in *i*, and pouring oil through No. 4. The flame may be regulated or extinguished by means of the stop cock. The height of *e* above *g* may be equal to, but must not exceed, that of a column of oil, whose pressure shall be equivalent to the pressure of the column of mercury.

From the foregoing description it will be seen, that the height of the columns of oil and mercury, remain at all times the same; thus affording the grand desideratum in lamps of this description, viz. an equable flow of oil, which has not been obtained in any other lamp, constructed upon pneumatic or hydrostatic principles, which has come under my notice. The form and arrangement shewn in the drawing, were the best that circumstances, and the materials at my command would admit of. I found the lamp to afford a steady light upon the first trial, but cannot say how far it might answer for general use, as I had the misfortune to break it the day after I had completed it. I remain,

Your most obedient Servant,

J. M.

COMPARATIVE VIEW OF

FOREIGN AND BRITISH MACHINERY,

AND PROCESSES IN THE ARTS.

CEYLON. N°. VI.—[Continued from page 152.]

The still commonly used by the natives of Ceylon is represented in the annexed cut:—It is constructed wholly of earthenware, excepting the tube of communication between the alembic and the refrigeratory, which is of bamboo. *b* is the body (or boiler) of the still; *a* is the capital luted with clay to *b*; *c* is the bamboo tube which conducts the vapour into the receiver *d*, where it is condensed by being immersed in the vessel of cold water *e*. It is with this rude apparatus (according to Dr. Davy) that the Singalese distil in the open air that fine spirit *arrack*, which is obtained from *toddy*, the fermented juice of the cocoa nut.

As cocoa-nut trees are very abundant in Ceylon, the manufacture of spirits on the large scale for exportation would most likely be attended with profit to the individual and advantage to the island: this is, however, a question for others to discuss; our business will be confined to noticing the modern improvements that have been made

in the apparatus, and in the process, and afterwards to suggest what appears to us as best calculated for adoption under the local circumstances of the Singalese.

Having in our 10th, 11th, and 12th numbers (first series) treated rather largely of the *process* of distillation, as generally practised in European countries, our remarks must chiefly be confined to the mechanical arrangements. For descriptions of the various improvements in which, the Register of Arts and Sciences is already preeminent, as will appear by a reference to the following list of new patent stills, which embrace all the recent improvements, and are among the most conspicuous inventions of the day, they being for the most part actually used in the large distilleries of this country.

Sir Anthony Perrier's Distilling Apparatus, in which the liquid is allowed to flow gradually in a thin stratum, through a number of circular channels over a heated surface, while drag chains hanging in loops in the channels are made to revolve by the operation of a wheel and pinion, which agitate the liquid and scour the bottom of the vessel, and prevent the burning of the substances heated; is fully described with engravings, *vol.* 1, *p.* 10, *first series.*

Tritton's Patent Still—in which the liquid is boiled *in vacuo.* The vessels are arranged in the manner of Woolfe's apparatus; the body of the still is immersed in a water bath; the pressure of the atmosphere is removed by an air pump; and the distillation is (it is said) conducted at the low temperature of 132° Faht.; described with an engraving, *vol.* 1, *p.* 149, *first series.*

Winter's Patent Still.—The vapours from this still enter first into a receiver immersed in a water bath, *heated* to about 170° Faht., where passing through circuitous passages, the aqueous vapours, or that portion of them which require a heat of more than 170° are condensed: the most volatile proceed to a second receiver contained in a bath heated to 140°, where having to ascend some very narrow passages between concentric cylinders, the weakest portion becomes condensed, and highly-concentrated spirit is thus separately obtained

by a single process; described with engravings, *vol.* 1, *p.* 161, *first series.*

Saintmarc's Patent Distilling Apparatus,—in which the arrangements are for the most part contrived for the peculiar purpose of obtaining brandy or other spirit from potatoes; the vessels are numerous. The potatoes are washed, reduced to a pulp, and the pulp decomposed by boiling with dilute sulphuric acid; afterwards, the acid is saturated with lime, the liquid rendered clear, then fermented with yeast, during which process hydrogen gas is forced into the vat by means of a pump. When the vinous fermentation has ceased the liquid is drawn off into a still, having, instead of a head, a long perpendicular neck, that the external air upon its surface may abstract a portion of the heat, and condense the aqueous part of the vapour. The spirit collected in the receiver after this distillation is transferred to another still of an ingenious construction; an accurate description of which, and all the apparatus, is given with engravings, *vol.* 3, *pp.* 25 *and* 41, *first series.*

Hebert's Distilling Apparatus.—In this invention (which is a contrivance of our own) the wash or wine is made to spread itself in an extremely thin and expansive sheet over a large hollow cone of copper, constantly running over its extended surface, and descending by its own gravity to the bottom. Within this hollow cone is situated the fire or water bath, which causes a rapid evaporation to take place over its whole surface; the vapour ascending from which, passes between the surface of the still and an external casing, also of a conical figure; from thence passing along the neck it enters a convoluted tube within a wash reservoir; the wash in this vessel being of a lower temperature, causes a portion of the vapour to condense and fall into a recipient beneath, where also the uncondensed part is received previous to passing into the lower chamber of a refrigeratory, from whence it ascends through numerous small metallic tubes surrounded with cold water: the vapour is thus *wire-drawn* as it were, and by the surrounding medium instantly condensed. The water of the wash separates itself at the bottom of the still, where it runs off through an aperture. The vapour in passing through the convoluted tube gives back a great portion of its caloric to the wash that surrounds it, and the wash in consequence comes upon the still hot, requiring but a slight accession of heat to drive it off in vapour; this vapour gives in like manner back the caloric it received, so that the quantity of fuel required to work such an apparatus is exceedingly small. By this arrangement also, the necessity of stopping the process to discharge and re-charge the still is *entirely superseded;* the operation commences by the turning of a cock, and *continues unceasingly,* i. e. as long as wash is supplied to the reservoir, and fuel to the furnace: described with engravings, *vol.* 3, *p.* 321, 1*st series.*

Grimble's Patent Still;—the inventor is a gentleman who takes a leading part in the direction of the large distillery of Messrs. Booth, in Cow Cross Street, London, where the apparatus is employed, and we understand very successfully. A kind of refrigeratory, composed of a great number of small copper tubes, are placed vertically over

the head of the still, through which the vapours must pass in their way to the condensing worm; the air circulates freely amongst these tubes, by which the heat of the ascending vapour is sufficiently abstracted to cause the aqueous portion to condense, and fall back into the still, so that nothing but strong spirit passes into the worm:—described with engraving, *vol.* 3, *p.* 369, *first series.*

Saintmarc's Patent Still. (second patent.)—This still is a column or cylinder, consisting of ten coppers or boilers, surmounting each other, with a furnace under the lowest. The eight lowest coppers hold the wash; the two upper, water. The lowest only, being submitted to the action of the fire is, consequently, the first whose wash enters into a boiling state. The vapour penetrates into the second, passing through the wash which is contained in it, is there condensed, giving up its caloric to that liquid, which is thereby quickly brought into ebullition: the vapour which proceeds from the wash in the second boiler passes into the third, producing the same effect as in the preceding. The same operation proceeds up to the highest, but with some variations in the mechanical arrangements to accommodate the increasing condensation, and the re-distillations that are going forward. The apparatus is very ingeniously contrived, and is calculated to conduct the process of distillation with great economy:—described with engravings, *vol.* 4, *p.* 49, *first series.*

Evans's Patent Still.—This invention is of a totally novel character; the still is a copper cylinder, which is made to revolve vertically over the furnace, by turning on a horizontal axis: a strong fire is applied to it, and the gross matter in the still is prevented from burning by the constant rotary motion of the wash: the vapour as it is generated passes through the hollow axis of the still, into a large worm which also revolves horizontally upon hollow axes, through one of which the vapour enters: the chamber which contains this revolving worm is kept at a temperature suited to condense the *aqueous* vapour, and to allow the spirituous to pass on through the other hollow axis to a refrigeratory of the ordinary kind. The large worm as it revolves conducts the water obtained by condensation of the aqueous vapour back into the still, something after the manner of the water screw of Archimides. The manner of charging the still, as well as most of the arrangements, reflect great credit upon the talents of the patentee, whose chemical studies and experiments led him to believe that *alcohol is not altogether the result of the vinous fermentation, but the product of a subsequent elementary change;* that a greater quantity of spirit might be obtained by subjecting the fermented liquor under distillation to a high temperature instead of a low one, and to enable this to be effected without carbonizing the substances submitted to the action of the fire, the rotary still and worm were contrived by him:—described with engravings, *vol.* 4, *p.* 161, *first series.*

Williams's Patent Distilling Apparatus—chiefly consists in an enlarged capacity of the still-head, to cause a separation of the aqueous vapour by condensation, previous to its passing into the refrigeratory; in a peculiar arrangement of vertical tubes, and a

flattened worm in octangular coils; and in an additional apparatus, containing refrigerating saline mixtures for the more effectually cooling of the spirit in warm climates or in warm weather: described with engravings, *vol.* 4, *p.* 294, *first series.*

We have thus given a slight sketch of the principal stills, (previously described by us in detail) for the information of those who may not have read the earlier numbers of our work; and we intend shortly to introduce in addition a particular description of the most celebrated French stills, and those of several other European countries: also, the recently-patented stills of Mr. James Frazer, of Major M'Curdy, and two or three others; which will render this work complete in its information upon the mechanical department of the art.

In our next paper under this head we shall describe some propositions of our own for the amelioration of the art of distilling in Ceylon, bringing into use the native earthenware vessels, but under a more economical arrangement; accompanied with an improvement, which we humbly conceive will be readily adopted in our own country.

SCIENTIFIC INSTITUTIONS.

City of London Literary and Scientific Institution.—On Wednesday, the 17th October, Professor Millington delivered the first of a course of Lectures *on Pneumatics*, at the Albion Hall, Moorfields, where the Lectures of this Institution are at present delivered: but a theatre for Lectures is now being erected on the premises of the Institution in Aldersgate Street.

Western Literary and Scientific Institution.—We understand that William Stone, Esq., of Deptford Dock-yard, is about to deliver a short course of Lectures at this Institution *on Naval Architecture.*

London Mechanics' Institution.—On Wednesday, 17th October, Mr. Wallis delivered his Second Lecture *on Astronomy*, and repeated the same to a different portion of the Members on the following Friday.

Mineralogy.

Naptha Springs.—In the vicinity of Bahon are still found some families of Guebres, or ancient Persians, and of Hindoos, who worship a supreme Being under the symbol of fire. There is a place about twenty worts from that city, where the priests of Zoroaster still maintain, by means of the naptha, the primitive fanaticism of the fire worshippers. Those priests, who have no other clothing than a piece of linen round their waists, pretend that the sacred fire commenced burning on that soil some millions of years ago; but as it seems they believe in the universal deluge, they must resort to some miracle to have preserved this flame from the inundation, especially as they have never enquired into the physical causes that produce the naptha. According to their belief, the supreme Being cast

Satan into these gulphs, from which immediately flames issued, which the Guebres are enjoined eternally to preserve. Notwithstanding their fanaticism, they do not hesitate in cooking their victuals by that fire, which they light in the same manner as gas, by applying a torch to the cavity made in the earth. The flame is extinguished by placing on it a wet cloth. There are springs or pits, which produce daily more than half a ton of naptha. In summer, when the southern winds increase the heat of the atmosphere, strong oscillations are experienced on that soil, and various phenomena witnessed.

NITRATE OF SODA.—In the district of Atacama in Peru, M. Rivers points out the existence of a bed of nitrate of soda, several feet thick, and fifty miles in length. It is three days journey from Conception, and Iquiqui, in Peru.—*Bul. Univ.*

MASS OF GOLD.—In the month of May last, there was sent by an express to St. Petersburg, a mass of pure gold, weighing about twenty-five pounds. It was found five feet beneath the surface, in the environs of Miaeski, from which place several large pieces of inferior weight had before been transmitted.—*Ibid.*

LIST OF EXPIRED PATENTS,

Continued from page 144.

EARTH.—To J. Hamilton, of Dublin, for a new application of earth and other materials to useful purposes. Dated July 31, 1813.

LOOMS.—To Wm. Horrocks, of Stockport, for improvements in weaving machinery. Dated July 31, 1813.

GLASS.—To E. Heard, of St. Luke's, Middlesex, for improved processes in the manufacture of glass. Dated August 9, 1813.

WATCHES.—To R. Westfield, of St. James's Street, Clerkenwell, for improvements in horizontal watches. Dated August 9, 1813.

PANAGRAM.—To John Casson, of Liverpool, for a *panagram*, or machine by which the blind can be taught to read the languages, music, arithmetic, &c., by touch or feeling. Dated August 9, 1813.

CUTTING-OUT CLOTHES.—To George Scott, of Alnwick, for a machine for cutting-out men's and women's wearing apparel, and other articles. Dated August 9, 1813.

CARRIAGES.—To John Hancock, of Reading, for improvements in the construction of carriages. Dated August 25, 1813.

"MOVEABLE CHARACTERS."—To John Naish, of Bath, for a method of making moveable characters for composing names and professions. Dated August 26, 1813.

IMPROVED SCYTHES, &c.—To T. Y. Hunt, of the Brades Steel Works, Staffordshire, for a back for scythes, sickles, &c. Dated August 26, 1813.

DISTILLERY.—To F. Parkinson, of Kingston-upon-Hull, for a still and boiler. Dated September 4, 1813.

EMBOSSING IVORY.—To John Westwood of Sheffield, for a method of embossing ivory by pressure. Dated September 4, 1813.

CAPSTAN AND PUMPS.—To Jacob Brazill, of Yarmouth, for a machine for making ships' pumps and capstans. Dated September 4, 1813.

PLOUGHS.—To the Rev. Henry Listen, of Ecclesmachan, Linlithgow, for an improved plough. Dated September 23, 1813.

METAL CYLINDERS.—To Henry Osborn, of Whitmore House, Warwickshire, for a method of making tools for tapering of cylinders, bars &c., of metal. Dated October 15, 1813.

INLAND NAVIGATION.—To Robertson Buchanan, of Glasgow, for propelling vessels, water-wheels, dredging and deepening rivers and harbours, and impelling machinery. Dated October 18, 1813.

TO OUR READERS AND CORRESPONDENTS.

Our Glasgow correspondent's letter has been returned, in conformity to a rule which we must of necessity adhere to.

We thank Mr. AINSLIE for the trouble he has kindly taken.

The fire escape of S. S. W. we must decline; it is too complex and too bulky for adoption.

Mr. RICKETTS's favour is unavoidably postponed till our next.

PATENT APPARATUS FOR THE EXPLOSION OF FIRE DAMP IN COAL MINES.

By Mr. W. Wood, of Summer Hill Grove, Northumberland. *Enrolled Oct.* 1826.

The many disastrous accidents from the explosion of hydrogen gas in coal mines, renders it an imperative duty on our part, to give publicity to every contrivance, having for its object the prevention of those occurrences; whether or not we may agree with the projector in the superior effectiveness of his plans, over others that have been proposed, or that may now be in practice. The present invention, however, we cannot but regard as one of the greatest utility, and as calculated for the saving of many valuable lives, to whom we stand indebted for one of the chief necessaries of existence.

The firing of hydrogen gas in those parts of mines where it accumulates in quantity, has been practised for many years past, and numerous were the accidents that occurred, notwithstanding every precaution was taken by the *firemen* to save themselves from the effects of the explosions. The operation was usually performed by

an apparatus,* consisting of a long pole, or series of poles, fitting into one another, like a fishing rod, so as to be elevated to the break or *pot hole*, where the fire damp was accumulated; at the upper end of this pole, is a small sheave or wheel, over which a copper wire passes, of sufficient length to reach to any distance within the area of the mine from the horse stable; this done, the pole is firmly fixed in the place where the gas lodges; a candle, fixed to a piece of lead or other substance, to keep it upright when suspended, is carried by the fireman as far towards the explosive region as safety will admit of, when it is set upon the floor, and fastened to one extremity of the copper wire; this done, the firemen retire to the stable, which is made strong and well secured, in order to barricade them: the other extremity of the wire is passed through a crevice in the door, by means of which they draw the wire until the light gets to its destination; in some instances they remain pent up a considerable length of time, in the greatest suspense, owing to some accidental circumstance having put the candle out, before it reaches the *pot-hole*; when they are fearful of venturing out, from the uncertainty of what may be the event.

In many instances it has been found necessary to explode these lodgements three times a day, at each time clearing the mines of all the workmen, except the firemen; the necessity of which has been occasioned by the miners cutting down strata, or measures of coal, so as to render their roof higher than the general run of six or eight feet seams, and by these means, making the extra elevation too great, to be affected by the diluting current. In short, when the roof of a coal mine, where the seam is thirty-six feet thick, is cut down, no means but the firing process, could suspend for a single day, the destructive effects produced by an explosion affecting the whole mine. The expence of this process, besides the loss of many of the firemen, was immense. It was necessary to leave an unusual substance of coal in the pillars, to support the roof against the shocks; the body of coal itself was besides damaged by the concussion, and by the heat attendant upon the combustion of the gas, a heat which frequently set fire to a seam of coal, and required the stoppage of the shafts for its extinction.

To obviate the dangers and difficulties of the firing process, and to devise some safe and effectual means of clearing mines of inflammable gas, Mr. James Ryan, (of Netherton Colliery, near Dudley,) devoted himself with an ardour and perseverance, that entitle him to universal respect and admiration. Having been for many years, practically engaged in the working of mines, he investigated the subject, not only as a mechanic, but as a philosopher. In lieu of the dangerous firing process, he proposed a judicious system of ventilation, by which the inflammable gas, (fire damp,) was carried off upward from the mine; while, by another arrangement, he caused the carbonic acid gas (choke damp) to pass off into the water level. Our limits prevent us from describing his excellent system of ventilation, in this place, but we shall take the opportunity of doing so,

* As described by Mr. James Ryan, in the 84th Vol. of the Transactions of the Society of Arts.

at some future subject time. In attempting to get his plans of ventilation tried at various mines, which he offered to clear of their destructive agents, at the risk of his own life, he met with the most stubborn opposition; and when, by the influence and recommendation of men of talent and wealth, he was at length permitted to try the effect of his plans, and notwithstanding these proved invariably eminently successful, all sorts of dirty expedients were resorted to by a cabal of ignorant men, to check and thwart him in his heart-cheering progress. These facts are expressly asserted in the certificates of men of high rank and character, which accompany Mr. Ryan's communication to the Society of Arts; and the certificates bear such ample testimony, of the advantage of Mr. Ryan's system of ventilation, that we are greatly surprised to find that the firing system is persevered in, insomuch that the patented invention of Mr. Wood, that we have now to describe, is for an improvement upon the ordinary firing process; by which, however, all *personal* danger in conducting it, is avoided.

The diagram which precedes this article, is intended to represent a sketch of the interior of a coal mine, in perspective, with Mr. Wood's apparatus employed in igniting the gas. It consists simply of a common Dutch striking clock, in which the descent of a weight at a previously determined hour, raises a lever, having a counterbalance weight: this lever, acting upon another lever, causes a match charged with the oxymuriate of potash, to be dipped into a bottle containing sulphuric acid; the counterbalance weight on the first lever, immediately afterwards draws the match out of the bottle, when the contact of air causes ignition to the match, to which a train of combustible matter is connected, consisting of cotton or tow, saturated with spirits of turpentine.

a represents the weight of the clock, which is set to go off at the time denoted: a projecting piece at the bottom of the weight, presses in its descent, upon one extremity of a lever, which turns upon a fulcrum at *b*: the other end of this lever is provided with a roller *c*, which raises the loaded end *d* of another lever, supported upon a standard *e*: at *f* is a rod, attached by a joint to the other extremity of the second lever, and at the lower end it is jointed to a small block, to which is fixed the match. To the match is attached some loosely twisted filaments of cotton, which are carried upward, and wound round an iron rod above as loosely as possible, so as to form a large bunch of easily ignitable matter, to further which, the whole is saturated with spirits of turpentine: the iron rod containing the bunch of cotton, slides up and down in a fixed standard *i*, as represented; and from this point a train is made to other parts of the mine, where the inflammable gas may have collected in a detached volume, by means of strips of brown paper dipped in oil of turpentine, which are strung together and suspended in festoons, on standards fixed in the ground.

The clock being set, to go off when all the workmen are absent from the mine, or at rest, the weight operates upon the levers, at the precise period determined on, ignites the match and the train, by which all the inflammable gas is destroyed.

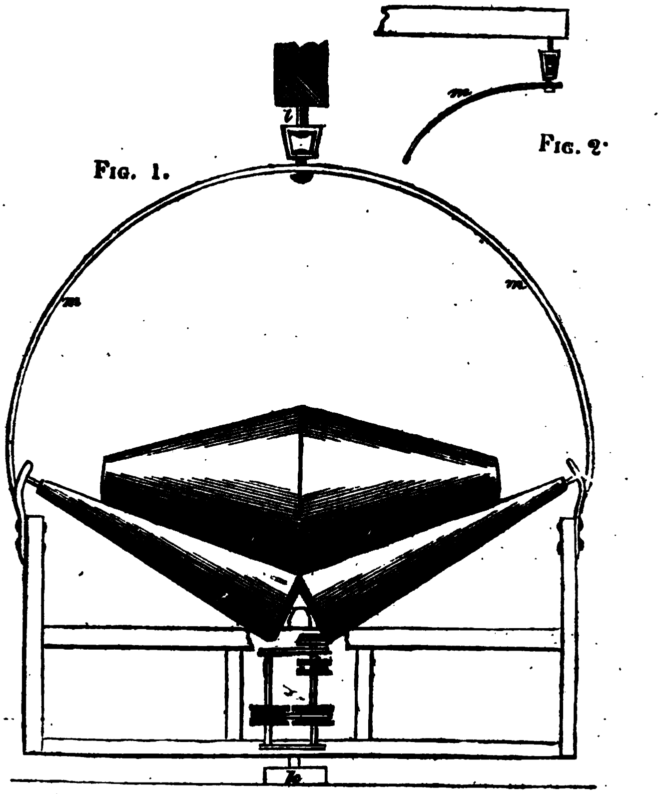


Fig. 1. Fig. 2.

PATENT HAT MAKING APPARATUS.

By Mr. G. Borradaile, of Barge Yard, London.—*Enrolled May*, 1826.

This is an improved machine for the making, or *setting up of hat bodies*, as it is termed, in which several cones, or frustrums of cones, are made to revolve upon their axes; and the frame in which these cones act, being made to vibrate horizontally on a fixed pivot and swivel, the filaments of wool are caused to traverse each other diagonally as they are wound upon a double cone, and by that means to produce a matted substance, which is afterwards to be wetted, shrunk, and felted together in the usual manner. The bodies of two hats, each of a conical figure, are thus made over the surface of the double cone, which are separated by cutting them along their middle or base line, and slipping them off at each end.

a a in the diagram, represents this double conical block, and *b b* two conical rollers, of which there are two more on the opposite side of the machine, not seen in this view. The axes of these four rollers are placed in such an inclined position, as to admit the

double cone *a a* to bear equally upon them. The two front cones *b b*, have fixed upon their bases, two bevilled toothed wheels, which gear into one another as shewn, and rotary motion is given to both, by the teeth of one of them taking into a bevilled tooth and pinion, that revolves upon a vertical spindle, to which motion is communicated by a band and rigger. The large double cone *a a* therefore is made to revolve slowly, by the friction of its surface against the four conical rollers underneath. The *sliver* of wool, being conducted from the dofter of a carding engine placed behind the machine, to the upper side of the double cone *a a*, and the cones *b b* being made to revolve as before described, causes the sliver of wool to be wound round the periphery of *a a*, in an uniform layer.

In order to give a diagonal crossing to the filaments, as they are wound upon the double cone, the machine is made to turn partly round horizontally, upon the pivot *k* in front, and upon a swivel joint *l* at top, to which the back part of the machine is attached by a bent rod *m m*, the form of which bent rod is explained by the separate Fig. 2. The gearing by which the vibrating motion of the machine is effected, is not brought into view in the figure, as it could not be distinctly exhibited; but it may be easily comprehended, that a rotary crank, and a lever, will effect this movement. The invention claimed by the patentee, is simply in the double cone, or frustrum of cones, revolving, by the friction of its surface, against other rotative cones.

PATENT MODE OF SEASONING TIMBER.

By J. S. LANGTON, ESQ. of Langton Juxta Partney, Lincolnshire.—*Enrolled, February* 1826.

THIS invention consists in a process for extracting the sap from timber, by exposing it to a great heat, in a vacuum.

Cast iron vessels are to be prepared of sufficient capacity to contain the timber to be seasoned; the patentee proposes to have them about 30 feet long, five broad, and of a cylindrical figure. The timber being deposited therein, the vessels are to be closed air-tight by flanges drawn together by screw bolts, with luting between: the air is now to be extracted by means of a pump, when hot water or steam at a high temperature is to be let into a casing or jacket surrounding the vessels, the heat from which will cause the sap and other vegetable juices to be expelled from the wood in the form of vapour, which is withdrawn by the continued operation of the air pump, as long as the evaporation from the wood continues. The communication from the air pump to the timber cylinder, is made through a refrigeratory, by which arrangement the vapours are condensed in their passage to the pump.

The time required to complete this process depends upon the size of the timber operated upon—for small scantlings ten hours is sufficient, but for the largest trees as many days are requisite: but the completion of the process is at any time ascertained by the indications of a mercurial guage.

PATENT APPARATUS FOR ASCERTAINING THE DEPTH OF WATER IN SHIP'S HOLDS.

By Mr. J. Tabor, of Jewin Street. *Enrolled, February* 1826.

On each side of the keelson* of a vessel, are fixed two boxes of sufficient depth, perforated with holes for the free passage of the water that may be in the ship's hold; each box contains a float, attached to a chain which passes through an aperture in the upper side of the box, and between anti-friction rollers: the chains are then connected to strong wires which pass through the deck or decks, and are carried up alongside the main mast; above deck the wires are separately connected again to small chains, which chains respectively pass over two pitched wheels or pullies with their extremities hanging down, and entering two other boxes fixed a little below the wheels; each wheel revolves independently of the other, and is provided with a distinct index which traverses a graduated dial plate.

From this arrangement it is evident that when the ship rolls, or is in an inclined position, by which the bilge water is thrown or lies wholly or partially on one side of the keelson, the indexes point out the quantity; as the float on the surface of the water rises with it, the weight attached to the float becomes unsupported, and draws round the wheel and the index, which points out the height the water rose it; on the other side of the keelson, the water retires, the float in the box on that side sinks, and pulling up the weight, draws back its pulley and index, which then points out the decrease of water on that side; so that by this contrivance, notwithstanding the heaving motion, or inclined position of a ship, a tolerable judgment may at all times be formed of the total quantity in the hold.

[We would here enquire whether it would not be a little improvement to this apparatus to have a tabular calculation on the dial plate, that should exhibit the total quantity or weight of water the hold contains according to the indications made by the operation of the floats and indexes: this calculation to be founded upon a cubic admeasurement of the hold at various horizontal lines? The dial plate only would be required to be expressly made for the particular ship. To know the exact extent of a danger leaves the mind vigorous and active to provide an adequate remedy.—Ed.]

IMPROVED KITCHEN RANGE.

4 & 5, *Castle Court, near Bedford Street, Strand.*

Sir,—The time of year having arrived when we require more heat, and as it is a general wish to obtain it with as little cost, and as much utility as possible, I have sent a plan of an economical stove; having made some of the kind last winter, which answered so well as

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* Keelson, pronounced kelson, a piece of timber forming the interior of the keel, being laid upon the middle of the floor timbers immediately over the keel, and serving to bind and unite the former to the latter, by means of long bolts driven from without, and clinched in the upper side of the keelson.

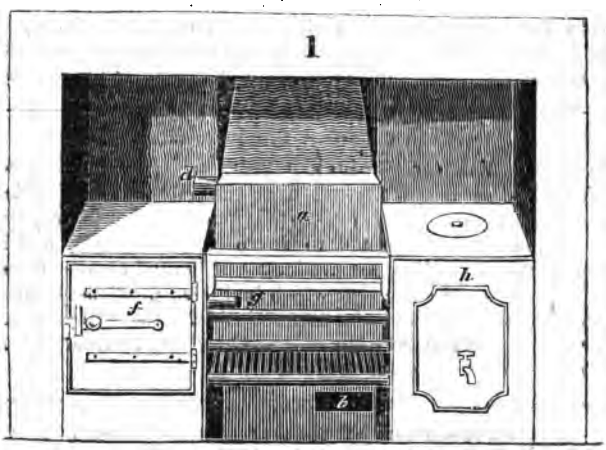
to induce me to make it public through your excellent magazine of useful information. They were made with an oven, boiler, and hot air chamber, all combined in one stove; heated by one fire, without flues; and what also is of very great importance, they are manufactured at a trifling difference in expense from the common range, and not at all likely to be put out of repair. The hot air chamber or double back, to which I wish to direct particular attention, being new, and considering it will be found useful for heating shops, &c. or any place where there is no opportunity of fixing a stove, or the appearance of one would be objected to.

N°. 1, the range as fixed: N°. 2, the hot air chamber distinct: N°. 3, a vertical section of the hot air chamber. The same letters in each figure refer to similar parts. *a* the hot air chamber; *b* cold air drain or aperture at bottom of chamber; *c*, thin iron plates or ribs 2½ inches wide, to direct the passage of air against the heated back of the chamber, producing a current of hot air, which may be communicated by pipes from the nozzle *d* to any part of the building; *f* conducting oven, heated by the knob of iron *g*, (for which invention the Society of Arts, &c. awarded 20 guineas); *h* an iron boiler, to which steamers may be applied.

I am, Sir, your most obedient Servant,

CHARLES RICKETTS.

[The extreme simplicity of this combination of a kitchen range with a hot air stove, cannot fail to render it very effective, and consequently very useful.]—Edit.



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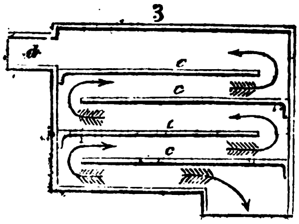

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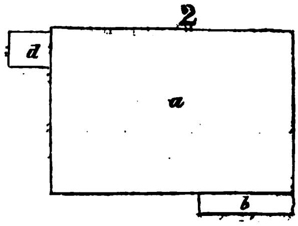


PATENT TULU METAL.

By T. J. Knowlys, Esq. of Trinity College, Oxford.—*Enrolled, December* 1826.

This patent is for a new alloy, to be employed as an ornamental metal in inlaying articles of gold and silver; the colour being a medium between both these metals.

Half an ounce of silver, and 3 ounces of copper, are to be melted together; when fused, five ounces of lead are to be added by degrees, stirring it frequently with a dry wooden rod, that the lead may be thoroughly incorporated with the other metals: one and a half pound of sulphur, and half an ounce of sal ammoniac, are now to be added, and the stirring continued until the sulphur is volatilized. The alloy thus made is next to be poured out of the crucible, into another vessel containing a stratum of the flowers of sulphur over its bottom, which vessel is then to be closely covered, and the metal allowed to cool: after which it may be cast in the ordinary way into ingots for use.

The articles intended to be inlaid being prepared with the engraved incisions, or indentations, according to the design, the alloy is to be reduced in a mortar to a fine granular powder, and made into a paste with a strong solution of sal ammoniac in water, with which the incisions or indentations are to be filled, and allowed to dry thereon, in a cake of a thickness according to the depth of the intended design in relief; in this state it is exposed to a sufficient heat in a muffle, to fuse the alloy, which becomes fixed or soldered to the gold or silver articles. The excess of alloy is now to be cut or filed away, leaving the design raised above the surface of the gold or silver, to be finished afterwards by polishing, chasing, &c.

Diamond Lenses for Microscopes.

In our 4th Vol. (first series), p. 360, we gave some account of Mr. Pritchard's diamond lenses; since the publication of which Mr. P. has drawn up a very interesting paper, on the properties of various diamonds, as adapted to microscopic purposes, and in the process adopted by him for producing spherical curves from that refractory substance; to effect which had been previously considered by experienced opticians to be impracticable. Mr. Pritchard's paper is inserted in the last Number of the Quarterly Journal of Science, to which we must refer our readers.

Preparation of Cafeine, by M. Garot.

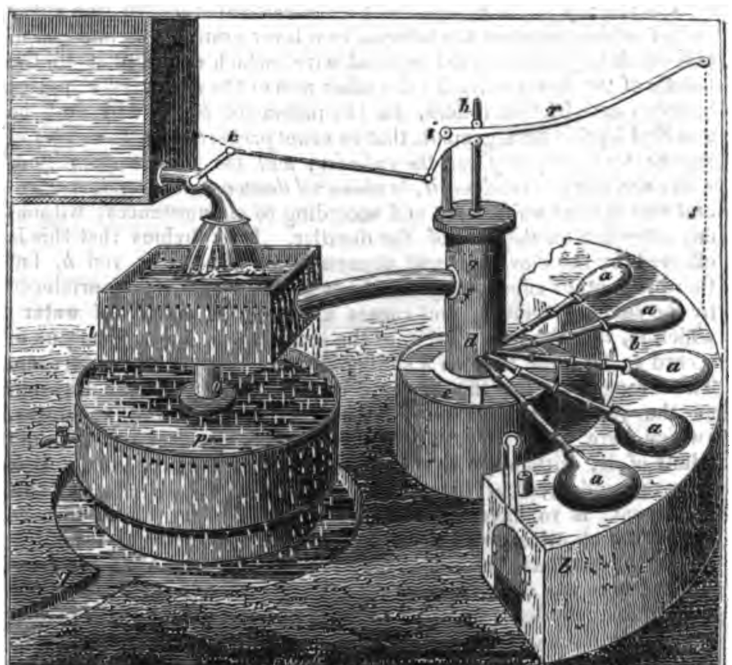
The coffee was broken, and digested in boiling water: the liquor so obtained was brown, and being treated with acetate of lead, yielded an abundant greenish precipitate; this was removed by a filter, and left a yellow liquor, through which a current of sulphuretted hydrogen was passed, to separate a little lead remaining in it; the free acid left was then saturated with ammonia, and the clarified liquor, when evaporated, gave crystals of cafeine.—*Jar de Phar.*

COMPARATIVE VIEW OF

FOREIGN AND BRITISH MACHINERY, AND PROCESSES IN THE ARTS.

CEYLON. N°. VII.—[Continued from page 175.]

THE improvements in distillation alluded to in our last, have for their objects the economy of fuel, time, and labour, and the prevention of accidents by proportioning the means of condensation at all times to the exact quantity of vapour raised. In the construction of an apparatus to effect these objects, we do not profess to employ the *most desirable* materials for each part distinctly considered, it having been our study to confine ourselves, as much as possible, to the *convenient and cheap mechanical resources of the Singalese people:* at the same time we have the satisfaction of thinking, that some of our hints may be found useful in other countries, where the arts have attained a higher level: we shall here annex an explanatory diagram of them.



HEBERT'S SELF-REGULATING CEYLON STILL.

a a a a a, are the heads of a series of earthen boilers, of the kind described in our last; but instead of being exposed to the air, they are set in a close furnace *b b*, built of clay, or of the same materials with which their pottery is formed. This furnace is proposed to be

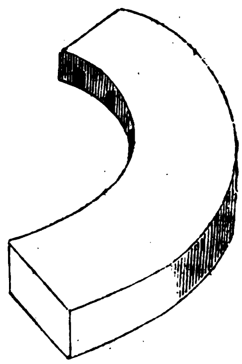
built in a circular form, to any convenient extent, so as to surround wholly or partially the other parts of the apparatus; we have for this reason shewn it in the drawing as *broken away*, after being extended sufficiently, to allow of five vessels being fixed therein. The curved figure of the furnace, is given to it chiefly with the view of affording a convenient means of connecting the *bamboo* tubes, which conduct all the vapours from the several stills into the cylinder *d*; this cylinder is fixed firmly in a closed vessel *e*, which serves both as a recipient for the condensed liquid, and as an enlarged chamber for the vapours. On one side of the cylinder *d*, there is an oblong aperture made longitudinally for the egression of the vapours, which is covered by a *light* piston; so that when the vapours have attained but a very little more elastic force than is sufficient to overcome the pressure of the atmosphere, this piston is lifted, which uncovers the aperture to a certain extent, and permits the vapours to pass through a large *bamboo* tube of communication, into a thin *metal* refrigerating box *l*; this metal box is supported by a strong tube *o*, fixed into the close recipient *p*; the tube being open to both.

On the top of the cylinder is fixed a vertical standard, the upper end of which becomes the fulcrum to a lever crank *i*: to one end of this crank is jointed a rod or stout wire, which connects it to the handle of the water valve *k*; the other arm of the crank lever, passes between anti-friction rollers, on the piston rod *h*. It will now be manifest by this arrangement, that *in exact proportion to the volume of vapour that escapes from the cylinder, will the precise quantity of water necessary to condense it, be showered down upon the refrigeratory*: and this is done uniformly, and according to circumstances, without any attention on the part of the distiller. It is obvious that this is effected by the elevation and depression of the piston rod *h*, but there is another effect of equal, if not greater, importance produced by the same movement, that causes an increased supply of water; which is, that the long arm, *r*, of the lever crank, may, by means of a cord *s*, be made to open a sliding door or damper to the furnace. The arrangement for this purpose is not completed in the drawing, as the relative positions of the several parts of the apparatus, (which were made without attention to this circumstance), do not admit of it, without great distortion of the perspective lines. It is however evident, that the simplest or shortest way of effecting this movement, is to have the water valve and the end of the furnace opposite each other, with the cylinder in one line between them.

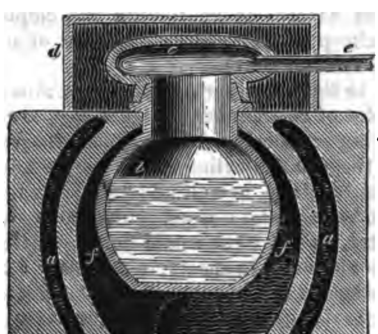
In the distillation of ardent spirits, especially from the more gross fluids, there is a disadvantage to a certain extent in the use of the piston and cylinder. In order to overcome the weight of the piston, the elastic force of the vapour must be increased, and this cannot be done without an increased expenditure of fuel, and an increased liability to empyreuma, or burning of the matters in the still. These are evils unquestionably, but what will they amount to, if the piston be made *very light*, only of sufficient weight to overcome the friction of its greased periphery against the smooth sides of the cylinder; or if the piston were of the ordinary kind, with a counter-balance

weight? But little excess of heat we imagine would be necessary to generate vapour of sufficient elastic force to overcome the pressure of a few ounces upon so large a surface. Probably four or five degrees above the boiling point of alcohol would be sufficient: an excess of temperature, which we humbly conceive our *gin spinners* (as they are ludicrously termed) are not very nice about. And let it be considered, that we have provided against *too much* heat; for when the vapour accumulates in sufficient force to elevate the piston to a certain height, a properly constructed counterbalanced damper, adapted to the purpose, (which we will not here describe,) is put into operation.

Another strong objection we anticipate will be made by our scientific readers, to the circumstance of the heads of the stills *(a a)* being exposed to the air, which, condensing a portion of the vapour, will cause the liquor to run back into the still. This defect, though common to almost all stills, does not appertain to our Ceylon stills, whose heads we propose to keep hot, by putting over them a cap of wood or pottery, like that delineated in the margin; which will envelope them in a heated atmosphere.



To prevent the escape of the heat through the clay walls of the furnace, they are made double, with a stratum of charcoal between,



as represented in the above sectional view; in which *a a* represents the strata of charcoal, imbedded in the surrounding clay: *b* the boiler: *c* the head, luted to the boiler, inclosed in the box *d*, through an aperture in which the neck *e* passes, that conducts the vapour to the cylinder: the cavities round the boiler *f f*, are for the heated air: and *g* the hearth, on which the wood is thrown at one

end of the furnace. The clay walls of the furnace should be built up by slow degrees, that is to say, about six inches in height at a time, allowing sufficient intervals for it to dry and solidify in the sun, or by artificial heat. The fissures that occur in the drying, may be filled up with native cement, or the luting used in connecting their earthen vessels. During the progress, an uniform groove should be made in the clay, for depositing the powdered charcoal; and the walls may be baked, either before or after they are quite finished, by making a fire on the inside. A durable degree of hardness may, we have no doubt, be thus given to a clay built furnace, that will make it but little, if at all, inferior to brick. A furnace constructed in this manner, besides being cheaper, and easier made, is more effective than one of brick, as it is not usual to interline them with a non-conducting substance, which must allow of great portion of the heat to escape.

The imbedding of a layer of charcoal in the furnace, is very important in another point of view, as obviating an objection to the use of earthen vessels, on account of their being such slow conducters of heat. The superior conducting power of copper and other metals over earthenware, renders a brick furnace sufficient to retain the heat: but if we obstruct the passage of the heat in our clay furnace by a layer of charcoal, nearly the whole of it must pass through the boiler, from the superior conducting power of the latter: and thus we bring its advantages, nearly to a level with copper stills in brick furnaces. Joined to this, we think it probable, that the earthen vessels are not so likely to cause the matters under distillation to burn, as the metallic. Upon the whole, we cannot but feel assured, that under the modifications we have suggested, the Singalese will act wisely, in continuing the employment of their own native and cheap earthen vessels, instead of adopting the very expensive copper stills of Europe.

With respect to the other parts of the apparatus, it may be said of the *bamboo tubes* of communication, that they are far better than metal, as not being so calculated to condense the vapours, in their passage through them to the cylinder and refrigeratory; and the art of luting the parts together, is well understood by the natives. *The cylinder* need not be of metal; wood would do well, if lined with a thin sheet of metal, as the wear would be very little: the best thin pewter, or Britannia metal in sheets, would do for this purpose; it may be easily worked to lay smooth against the sides of the cylinder, and the soldering of it may be executed with ease by any body. The piston might be made of similar materials, and packed with hemp and grease. Whilst, however, we make this observation, we do not mean to infer, that it would not be better done by European artizans.

The refrigeratory *i* should be of thin metal of any kind, but copper is the best: we have drawn it of a square figure, as being easiest formed. The upper side has a ledge all round, for detaining the water from pouring off, and it is pierced with numerous small holes, that it may trickle through, and run down the sides in drops,

upon the recipient *p*, which has also a ledge all round with holes, for condensing what vapour may reach that vessel, and for cooling the liquid product therein. The latter vessel will do very well made of wood, or of earthenware; the water, after running off by the channel into a tank, may be pumped into the upper vessel, to be used over again.

The refrigeratory box would answer as well without the small perforations, and condense as rapidly, or more so, if merely covered with a piece of flannel or cloth, which would prevent the water from running off too rapidly.

The total cost of an apparatus of this kind, would not be one tenth of the ordinary utensils, manufactured in England for similar purposes; the Singalese can *make it wholly themselves, with their own natural resources; and as the still is self-regulating, the process of working it can be conducted with very great economy, in point of labour and personal attendance.*

[In our next we shall submit to our readers, a few mechanical hints for the *rectification* of spirits.]

SCIENTIFIC INSTITUTIONS.

The courses of Lectures announced in our last number, at the various Institutions, are still going on.

Useful Arts.

We insert the following in reply to the questions of T. D.

To Bronze Statues and Medals? The following process is the one adopted by M. Jacob, a skilful artist of Paris, for giving to newly cast bronze the colour of the antique:—dissolve 4 drams of muriate of ammonia (sal-ammoniac) and 1 dram of oxalic acid in a pint of wood vinegar; take up as little as possible of this solution at a time on a brush, which rub upon the metal (previously well cleaned) until it becomes dry, repeating the operation until the required depth of tint is obtained. To expedite the drying, the process may be conducted by the heat of a stove, or in the sunshine.

The Composition of Bronze? 14 lbs. of pure copper, 6 lbs. of zinc, and 4lbs. of tin. Melt the copper first, then add the tin and zinc.

To Brown Gun Barrels, or Bright Iron Articles?—Rub them over with aquafortis, or muriatic acid diluted with water, and lay them by until a complete coat of rust is formed. A little oil is then to be applied, and the surfaces rubbed dry by means of a hard brush and a little bees wax.

To preserve Iron from Rust? We do not know any thing more convenient and at the same time as cleanly and permanent as a little bees wax brushed over the articles. A solution of caoutchouc in five times its weight of oil of turpentine, and this solution dissolved in eight times its weight of drying linseed oil, which forms the varnish of air-balloons, is much recommended. Grease, oils, tal-

low, &c. are filthy applications, soiling every thing that comes in contact with them; and from the acids and water contained in them, they, after a time, corrode the metal they were intended to protect. There is a method adopted in manufactories of steeping bright iron articles in lime water, which preserves them for a considerable time against corrosion: our chemists might perhaps avail themselves of this hint to prepare some good composition for preserving this most valuable of the metals.

COMPOSITION OF ANTI-ATTRITION? 1lb. of plumbago, and four of hogs lard well incorporated together.

TO BRONZE IRON? We do not *positively* know the process, perhaps some of our readers will set us right, if we are wrong in saying that the method used for bronzing plaister figures will answer the purpose on iron equally well: it is as follows,—

TO BRONZE PLASTER FIGURES? For the colour of the ground, take Prussian blue, verditer, and spruce ochre, grind them separately in oil, and mix them in such proportions as will produce the desired colour. Then grind Dutch metal in a part of this composition, laying it with judgment on the prominent parts of the figure. In bronzing iron the Dutch metal is, we believe, usually ground by itself to a very fine powder, and rubbed on the ground by the finger in a dry state.

CHARCOAL.—From the experiments of M. Chevreuse, it appears that charcoal exists in two different states, depending on the temperature to which it has been exposed. When wood is distilled in a retort until it ceases to emit vapour, the charcoal produced is in the *first* state of carbonization. In urging the heat of the retort to a higher degree, the *second* state is produced.

Charcoal is a good conductor of electricity only in the *second* state, or after an exposure to a violent heat. As a conductor of caloric it is only so in a *second* state, in which its density is considerably greater than in the first state. With respect to combustibility, charcoal burns more easily in the *first* than in the second, which it is presumed is owing to the unequal conductibility of the substance in the two respective states.—*Bull. Univ.*

THE process of making Isinglass Wafers in France is as follows.—The isinglass being dissolved in water to a proper consistence is poured out upon plates of glass provided with borders, and laid upon a level table; to prevent the glue from sticking to the plates a little ox gall, or other fit material should be rubbed over them. Previous to the isinglass becoming quite dry, *i. e.* in about ten or twelve hours, they are to be cut through along the borders, to separate them before they entirely dry, which usually takes about fifteen hours. The leaves are then removed and cut as wafers are, with hollow punches. To give them various colours any of the pigments are to be added to the isinglass while in the fluid state. These wafers are sometimes flavoured with aromatics, essential oils, and fruits to give them an agreeable taste: for sealing letters they afford greater security than the ordinary paste wafers.

Indian Artists.—The Chitrakars or artists of Nepal commence their education at ten years of age, and hence acquire the great manual dexterity, which is displayed in the minuteness and fidelity of their drawings. Their apparatus is of the simplest kind· for outlines slightly shaded, a piece of charcoal, an iron style, and one small brush made of goat's hair, are all the implements employed, with which the artist seats himself on the ground, and without any support for his paper, executes his drawing. The colours he uses are brilliant and durable; but as the study of natural tints is no part of the artist's training, it may be easily conceived, that this is a branch of the art, in which he does not particularly excel.—*London Weekly Review.*

Natural History.

Calm at Sea.—One of our early navigators (Sir John Hawkins) relates that, in 1590, "he lay with a fleet about the Island of Azores, almost six months, the greater part of which time it was becalmed. Upon which all the sea became so replenished with various sorts of getties, and forms of serpents, adders, and snakes, as seemed wonderful; some green, some black, some yellow, some white, some of divers colours, and many of them had life; and some there were a yard and a half, and two yards long; which had he not seen, he could hardly have believed. And hereof were witnesses all the companies of the ships which were then present; hardly a man could draw a bucket of water clear of some corruption. In which voyage, toward the end thereof many of every ship fell sick, and began to die apace. But the speedy passage into their country was a remedy to the crazed, and a preservative to those who were not touched."

Captain Durville's Collection.—Messrs. Quoy and Gaymart, the naturalists attached to the scientific expedition commanded by Captain Durville, have transmitted to the Paris Museum twenty-five chests, containing more than five hundred objects of natural history. They consider themselves to have made sufficient observations to determine the establishment of eleven new *genera*, and one hundred and three new species. Yet these communications seem to be no more than the prelude to those which the expedition will hereafter enable them to make, especially from the exploring of the coasts of New Guinea.—*Le Globe.*

The Arrachaca Root superior to the Potato.—Dr. Hamilton, who has for some years maintained an active correspondence with South America, under the immediate auspices of the late Right Hon. G. Canning, has succeeded in obtaining a supply of the above roots, packed in powdered charcoal, from his correspondent, Mr. Watts, of Carthagena, eight of which from this precaution, arrived in a healthy state, and even begin to germinate. The mode of culture practised at Bagota, and at St. Andrew's Mountain, in Jamaica, on a poor soil, with little rain, throve and reached its maturity in eight months.—*Portsmouth Journal.*

Baron Wrangell's Collection.—It is stated in the newspapers that natural science will be greatly enriched by the expedition of Baron Wrangell, the enterprising Russian traveller, as Dr. Kyber has succeeded in bringing home many new plants and other curious specimens.

Mineralogy.

Cobalt in Missouri.—Messrs. Troost and Lesueur announce the discovery of an ore of cobalt in this state, yielding on analysis upwards of 75 per cent. of cobalt. If it be abundant, as there is reason to believe, the discovery is one of great value.—*New Harmony Gazette.*

Chemistry.

Composition of Vegetable Proximate Principles.—M. Marcet has analyzed several vegetable substances by means of oxide of copper, and finds them to have the following composition.

Roasted starch or artificial gum.		*Ordinary starch.*	
Carbon	35.7	Carbon	43.7
Oxygen	58.1	Oxygen	49.7
Hydrogen	6.2	Hydrogen	6.6

It therefore appears, that roasted starch contains much more oxygen, and less carbon than common starch. The quantity of hydrogen is also increased.

Starch obtained from malt gavel.		*Hordein.*	
Carbon	41.6	Carbon	44.2
Oxygen	51.8	Oxygen	47.6
Hydrogen	6.6	Hydrogen	6.4
		Nitrogen	1.8

The Potato.

Parenchyma.		*Gluten.*	
Carbon	37.4	Carbon	51.7
Oxygen	58.6	Oxygen	22.0
Hydrogen	4.0	Hydrogen	7.8
		Nitrogen	14.5

Zimoma did not appear to differ from common gluten.

Yeast.

Carbon	30.5
Oxygen	57.4
Hydrogen	4.5
Nitrogen	7.6

Geneva Memoires.

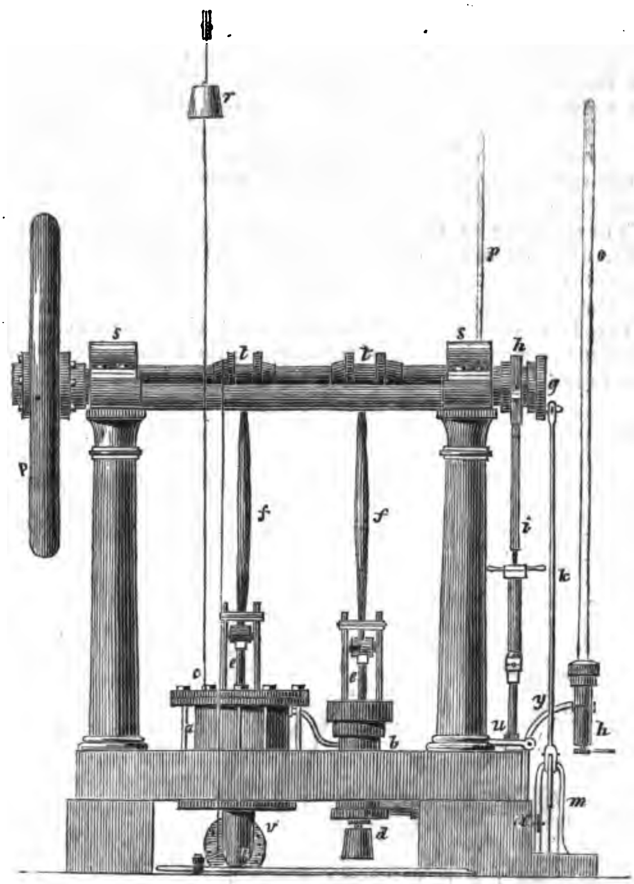
Public Works.

Canal Navigation, &c.—A prospectus has just been issued of a map of the inland navigation, canals, and rail roads, together with the site of the various mineral productions of Great Britain. It is made from actual surveys.

TO CORRESPONDENTS.

W. W.'s paper was not received, until after our present number was completed.

The newly granted and expired Patents in our next.



PATENT EXPANSION STEAM ENGINE.

By Mr. Jacob Perkins.

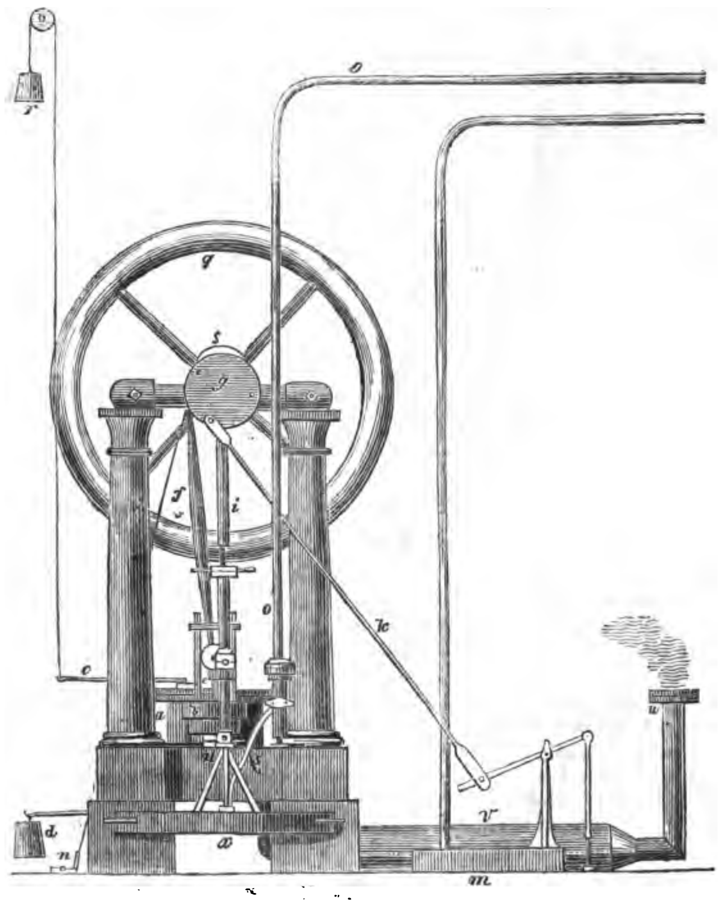
We have much pleasure in presenting to our readers a description of Mr. Perkins's latest and most important improvement in steam engines; for which, together with the illustrative drawings, we are indebted to that excellent artist and mechanical draftsman, Mr. Christopher Davy, of Furnival's Inn.

"The present improvement consists in a most ingenious arrangement of two working cylinders, to what may be termed a single stroke engine; these cylinders are of equal length, but the internal area of one is about eight times that of the other. The steam, at a pressure of about 100 atmospheres (1400lbs. to the inch), is admitted at the bottom of the smallest cylinder, and is cut off at about one-eighth

of its stroke; having forced up its piston, the steam then rushes through a short bent tube, into the upper part of the larger cylinder; here it expands again, and forcing down the large piston, escapes near the bottom through lateral openings into the condenser, and from thence into the atmosphere; while the steam that remains in the condenser at atmospheric pressure, is condensed by a jet of cold water, so as to produce a vacuum therein. Both pistons act nearly at the same time, by their rods being connected to a crank above them.

The steam being generated in a series of very thick cast iron tubes, as particularly described in Numbers 100 and 101 of the Register of Arts (first series), it will be unnecessary to notice that circumstance here.

Fig. 1. (on the other side), is a front elevation, and Fig. 2. (annexed), a side elevation of the engine; the letters refer to similar parts in both figures.



a is the large cylinder; *b* the small cylinder; *c* safety valve to large cylinder; *d* safety valve and weight to small cylinder; *e e* the piston rods; *f f* connecting rods; *h* an eccentric: *i* a jointed rod to the same; *g* a crank, which works the rod, *k*, of the forcing pump *m*; *n* injection cock, and cold water pipe for condenser *v*; *o* steam pipe; *l* throttle valve, *y* a pipe leading from it into the steam valve *u*; *x* a strong spring for closing valve; *q* fly wheel; *r* weight to safety valve *c*; *s s* plummer blocks to the main axle, in which are the cranks *t t*. *w* (Fig. 2), valve box and escape pipe for uncondensed steam.

The steam from the pipe *o*, enters the throttle valve *l*, and passing through the tube *y*, and the valve *u*, enters the lower end of the small piston *b*, where it acts upon the underside of the piston, and forces it up into the enlarged part of the cylinder; by this movement a lateral aperture is opened in *b*, through which the steam escapes along a curved tube, into the upper part of the large cylinder *a*; here it instantly expands, and forces down the large piston. Now the cranks *t t* are set at a very acute angle with respect to one another, so that the two pistons shall perform their up-strokes and their down-strokes nearly together, the small piston being always a little in advance of the large one; by this arrangement, sufficient time is afforded for the admission of the steam into the small cylinder, and the discharge of it into the other. The same steam having thus exerted its force upon both pistons, escapes at the bottom of the large cylinder into the condenser *v*, and from thence into the air, while that portion that remains in the condenser, from having expanded to atmospheric pressure, is condensed by a jet of cold water, which effects the vacuum. The induction pipe being now re-opened, the same action is renewed, and maintained by the revolution of the fly wheel.

The injection cock and pipe is shewn at *n*, and is worked by a cord attached to it, and passed round the cam on the main shaft. The piston rods, *e e*, are furnished with guide frames and anti-friction wheels, which being jointed to the connecting rods *f f*, allow the latter to turn with the revolution of the cranks, and produce upon the piston rods a *parallel motion*.

In order to determine and regulate the quantity of steam to be admitted into the cylinder, and to cut it off at the required point, Mr. Perkins has adopted a very simple and excellent contrivance: near one extremity of the main axle, there is an eccentric *h*, to which is attached the rod *i*; this rod is joined in the middle by a hollow and solid screw, by which its length is adjusted. This rod *i* passes through a guide, and opens the steam valve *u*,* so as to admit the required quantity of steam for working the engine: a very massive and strong steel spring is employed to shut the valve after it has been opened in the manner described.

Between the lower end of the rod *i*, and the lever of the valve *u*, there is an intermediate bar of iron, the removal of which renders the

* This steam valve is particularly described, with a large section of it, in No. 10, present series.

rod *i* too short to act upon the valve; by which means the engine may be instantly stopped at pleasure.

As the steam is condensed, it is drawn out of the condenser *v*, by means of the forcing pump, which discharges it through the pipe *p*, into the generators for the re-production of steam.

The fly wheel is five feet in diameter, and of great weight for its size, a particular description of which I will shortly furnish; most of the other details of Mr. Perkins's ingenious improvements in steam machinery have already been published in the Register of Arts, &c.

By the present improvement, Mr. Perkins gains, it is supposed, nearly double the power obtained by his previous modifications, owing to the circumstance of his using the steam twice over. The whole of the machinery is supported by four solid bright cast iron pillars, about four feet high, and occupying an area of 5 feet by 4, which gives the engine a very elegant, substantial, and compact appearance; the work being scarcely finished, its power has not yet been precisely ascertained, but that it is very considerable cannot be doubted upon a consideration of all the circumstances.

The many improvements introduced into steam engine machinery by this celebrated mechanic; his mode of generating steam at an enormous pressure with perfect safety; his manner of using it; the method of cutting it off, so as to cause it to operate by sudden expansion into a larger volume, and various other excellent contrivances, will cause the name of Perkins to stand high amongst those who have devoted their attention to this important subject.

C. D.

PATENT IMPROVED PIPES OR TUBES.

By Mr. Walter Hancock, of Stratford, Essex. *Enrolled Jan.* 1826.

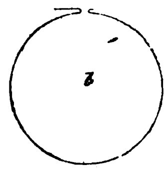
The object of the patentee is the construction of pipes or tubes for the conveyance of water and other fluids, that shall be as durable but less expensive than the cast iron pipes in general use. Sheets of iron or copper, or strips of those metals, are bent into cylindrical forms, then bound round spirally with iron hoops, and afterwards coated with a permanent and elastic water-proof cement. As the process of constructing these tubes is ingenious, we doubt not the following particulars of it will be acceptable to our readers.

The sheets or strips are selected of the appropriate lengths, breadths, or thicknesses for making the proposed pipes. In making a *cylindrical* tube of iron, the sheet must be of a greater width than the circumference of the tube required; and it should likewise, it is obvious, be of a true rectangular figure. Each of the two opposite edges lengthwise of the sheet are then to be doubled or folded back, as shewn by the annexed figure *a*,

a

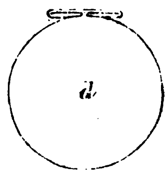
thus reducing the width of the sheet to the circumference of the tube

intended to be made: the sheet is then bent round by the ordinary means into a cylindrical form, as represented by the annexed cut *b*,

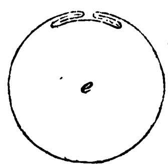


a slip or narrow piece of sheet iron, of the same thickness and length as the before-mentioned, with parallel sides, is then doubled back at the edges, in the same manner as in the above, and as shewn by the annexed figure *c*,

this piece is then slided over *b*, so that the edges of both shall mutually envelope and brace each other, in the manner exhibited by the annexed figure *d*,



The joints are then brought into close contact by hammering. This method of joining the edges of the tube may with equal facility be made on the inside, if in turning the sheet up into the cylindrical shape, it be bent the reverse way, as shewn by the annexed diagram *e*.



The projecting part of the joint is therefore in the inside, which is preferable in many cases. The tube as now described the Patentee calls his *inner* tube, to distinguish it from the exterior covering it afterwards receives, to give it increased strength and durability. This is effected by winding round the inner tubes iron hoops, or narrow strips of metal, in a spiral direction, with the coils in close contact generally, but sometimes a little apart, to give them elasticity in bending. The operation is performed in the following manner. The tube is fixed upon a wooden roller, of a diameter nearly corresponding with the internal diameter of the said tube, the roller being mounted horizontally upon an iron axle in a fixed frame, with a handle for turning it round at either or both end. One of the ends of the hoop iron (previously made sufficiently long by rivetting the ends of the separate lengths together) is then made fast to the end of

the tube by a rivet; and being held in an oblique position with the axis of the roller, the latter is turned round, while sufficient tension is given to the hoop iron, to make it apply close and tight to the tube during the coiling operation, after which it is fastened to the opposite end of the tube by another rivet; a hoop is now put on to each extremity of the tube, at right angles with the axis, for the greater security of the previous binding. But before these hoops are put on, they are heated, by which the iron becomes expanded, and the hoops are easily drawn on to the ends of the tube, and over the spiral coils, and by the contraction which takes place in cooling, they become fixed, close, and tight, upon the ends of the tubes.

The tubes are now to be immersed in a vessel of a sufficient capacity, containing a cement in a liquid state, by which means the joints, and all the interstices or spaces between the inner tube and hoop iron, and between the coils of the latter, become filled with it.

This cement is compounded of the following ingredients, mixed and melted together in the following proportions, viz.

2 lbs. of bees' wax.
2½ lbs. of linseed oil.
12 lbs, of common white resin.
18 lbs. of pitch.
1 lb. of tallow.
16 lbs. of plaister of Paris, or Roman cement, or quick lime in powder.

And when it is desirable to give a greater degree of elasticity and toughness to the cement, 2 lbs. India rubber, previously dissolved in five quarts of oil of turpentine, are to be added.

To protect the outside of the pipes from rust, one or more layers of canvass are to be wrapped round it, in which case the cloth is put on previously to immersing it in the cement, that it may be perfectly saturated with it. Sometimes, instead of cloth, a tube of sheet iron is used for the external covering, filling the intervening spaces with the cement.

In order to connect pieces of pipe together, a tube, similar to those already described, is prepared, of a length equal to somewhat more than its diameter; this tube is from half an inch to an inch greater in its diameter than the external diameter of the tubes to be joined, which are placed end to end, with the piece of connecting tube extending equally over each, and the annular space between the tubes is filled in with the cement, which effects a tight and impervious joint. To prevent the cement from getting in between the two opposed ends of the tubes, are previously brought closely together, and covered at the point of junction with a pley or two of loose spun yarn or oakum. Between these tubes and the connecting tube, there is placed at each end of the latter a ring of wood, that fills up the annular space, and keeps the pipes concentric with each other; the cement is then injected by an iron syringe, inserted in a hole in the connecting tube, by which every part becomes completely filled. The syringe is immersed in a pot of melted cement, kept hot for the purpose, which is thereby taken up, and a syringe-full injected at a time until filled.

Instead of iron, the patentee makes use of wood sometimes for his inner tubes : these are composed of a number of pieces, laid longitudinally in a circle: this tube is put upon a wooden roller, similar to the before mentioned, and being turned round, it is covered spirally with iron hoops. For large sized tubes wood is preferable, as being stiffer and stronger than those made of sheet iron of any moderate thickness. These wooden tubes thus covered with hoop iron, are immersed in the melted cement as before mentioned, either with or without a covering of cloth, or surrounded with an outer tube of sheet iron, as occasion may require.

PATENT INSCRIPTIONS,

Or a method of rendering the names of Streets, and other inscriptions of the like nature, more durable and conspicuous, by PETER MACKAY, of Union Street, Southwark.—*Enrolled June*, 1827.

THIS invention consists in painting the inscription, or the letters separately, on plates of glass, with white enamel; and to facilitate this operation, the patentee proposes to place letters under the glass, to determine the size and form of the letters.

The plates are then to be placed in the enamelling furnace, to melt and fix the enamel, and afterwards to be covered on the backs with black varnish or paint.

The plates are then to be secured in suitable frames of cast iron or wood, by Homelin's mastic or other cement, and fixed on the walls at the corners of the streets.

We have observed this plan already adopted in many of the principal streets of the metropolis, and where the old inscriptions remain beside the new, the superiority of Mr. Mackay's plan becomes very apparent.

WRIGHT'S PATENT CRANE.

IN giving, in our 11th Number, a description of this machine from one that had been publicly at work at the West India Docks, we took occasion to make some comments on the account previously published of it in the *London Journal of Arts*. Those comments have caused another monthly periodical to make a silly charge against us of publishing it prematurely, to the injury of the patentee; because the writer states it to be " an invention in an *early stage of progressive improvement*:" notwithstanding which assertion, this very consistent censor tells his readers, in the same page, that " *twenty of Mr. Wright's cranes have been ordered by the Directors of the West India Docks, and are* ACTUALLY DELIVERED *there, and* IN OPERATION." Does this writer then mean to charge Mr. Wright with delivering these cranes " *in an early stage of progressive improvement*," instead of a perfect state ?

With this remark we shall dismiss, for the present, our observations upon the writer above alluded to; and shall proceed to examine the charges made against us in the *London Journal of Arts*; and, to avoid even the suspicion of misquoting, we will insert that attack upon us, with our replies to it, in two opposite columns.

Attack of the London Journal of Arts. (November, 1827).

"WRIGHT'S NEW-INVENTED CRANE.

"The notice in our last number of this ingenious invention has called forth, as might reasonably be expected, considerable animadversion from among our readers."

"We are gratified in its having so done, because unlike the mass of periodical *literature*, which seems licenced to propagate the most absurd extravaganzas under the blushing head of SCIENCE, OUR Journal is expected to be the vehicle of such information as may claim the *critical attention* of its readers."

Our Reply.

It was reasonable to expect animadversion; since there is not an individual in the kingdom, in the slightest degree acquainted with mechanics, to whom the fallacies were not as apparent, as to ourselves.

Within two pages of this passage, the following example is given of the CHEMICAL information that "*claims the critical attention of its readers.*"—"It is suggested that common *rosin* may be employed, in preference to any other resinous matter. Any quantity of this GUM may be boiled with an alkali in a costic state, until it is brought to a thick pasty consistance." This occurs at page 152, and is only one example amongst a host of others, "*blushing under the head of Science.*" Of the editor's MECHANICAL knowledge the following examples (on the other side) are found all together.

"In asserting that extraordinary properties in this peculiar combination of mechanical powers appear to shake the old established axiom that power can only be increased at the expense of velocity, we certainly did not *mean* to deny the truth of that axiom, which cannot be overturned; but it will be seen, we spoke comparatively, for this crane does actually raise *heavy* weights with *less than half the power* of the best constructed crane heretofore used, and with the same, or even *greater velocity*."

If the editor *did not mean* to deny the truth of the axiom, why does he in other words deny it again in his attempted explanation. The only way of edging out of this dilemma, would be to assert that that beautifully simple contrivance, the toothed wheel and pinion, loses more than half its power of leverage by friction; but the writer cannot avail himself of this subterfuge, as he has already admitted this friction to be only *one seventh* in his October number, page 97, line 14.

"Now when the construction of this crane is laid before the public, it will be seen by what peculiar combination of machinery the advantage is gained over other cranes: for that an advantage is gained, appears very obviously in the facility and small power by which it is worked, compared to other cranes at present in use."

That we have already laid it before the public in our 11th number with great exactness, we have the writer's own admission, as the reader will see a little further on. Of its *advantages*, we do not here wish to speak; as all those of our readers who are acquainted with the first and self-evident principles of mechanical science, will immediately determine that point, without any remarks from us.

"We have not asserted that any hitherto unknown principal in mechanics has been discovered,—that any new mechanical power has been invented, but merely that by a very novel and ingenious combination of machinery, a crane has been constructed without wheel or pinion, (toothed wheel, of course, we mean), which is worked with *small power* compared to other cranes."

We have bestowed our utmost "critical attention" to this passage, without being able to ascertain what "*small power*" means. An ounce, or a ton weight; a child or a man may be made to work a crane of the ordinary sort. As respects what is said about *an unknown principle*, the third paragraph proves, that such an assertion was made, and is repeated.

Attack.

"*If it* is true, according to the generally received opinion, that two men will raise six hundred weight, (and no more, upon an average), at the rate of ten feet per minute, by any of the known combinations of wheel and pinion, or other mechanical powers, *then* we say, we prove our position, that Wright's crane gains upon that estimate, nearly, if not more than double."

Reply.

IF reconciles all absurdities and contradictions. The argument amounts to this:—IF two is less than one, *then* one is more than two. By our calculation of the work done at the trial on Thursday last, at the West India Docks, with the common crane, two men did twice as much work as stated on the other side. What then becomes of the *if?*

"Three labourers have been for some time employed at one of these cranes in Mr. Wright's factory, two of them constantly at work, relieving each other during the day, and *continually* raising and lowering a weight of one ton, and thirteen pounds, at the rate of 12 feet per minute. This certainly is a demonstrative proof of the facility with which the crane is worked; for though by extraordinary exertions, powerful men may perform great feats, (as we have seen the patentee himself alone raise this weight with ease), yet the continuance of the labour throughout a whole day, is a very fair criterion of the fact, that much more may be done with this crane than with others heretofore used."

These must have been very extraordinary labourers, for the three very powerful men that worked Mr. Wright's crane at the West India Docks effected no such thing. The "demonstrative proof" and the "criterion" are only so many words at present without the slightest application.

[Here follows a charge that must be met in another place, where the writer will be put to the necessity of proving it, or of suffering the consequences that must result from his inability to afford the slightest evidence of its truth.]

"The article in question states, that 'one or two of these cranes were 'sent to the West India Docks on 'trial.' The *trial* took place as long ago as June last, before the directors, and resulted in a positive order for twenty machines, of which seventeen were fixed, and in working order at the Docks, and the eighteenth gone down to be fixed, leaving only

As it seems by this statement that twenty cranes had been ordered, and seventeen were fixed, which were open to public inspection; and several of them had been used in conveying the cargoes of ships into the upper floors of the warehouses, surely we had a right, in common with the rest of his majesty's subjects, to give a description of them, and as

Attack.	*Reply.*
two to be completed. The author of this article had not waited to see the whole machine, but had published (in a way never before heard of, as if to anticipate what Mr. Wright may intend to specify) an incomplete diagram of a patent invention, the specification of which is not yet enrolled, and a description, in which he misapplies technical terms."	they were delivered to the Company's order, they were not Mr. Wright's property. The machine we examined was so far complete, that it had been previously employed in raising 300 bags of coffee to an upper floor; and a wager had been decided as to the power of the crane before a great number of persons. We were, likewise informed by the Secretary of the Company, as well as by several of the principal officers of the Docks, that the cranes had been *publicly used* some weeks before we made our sketch. Mr. Wright can still specify what he pleases; and it betrays an *entire ignorance* of the patent laws, to say that we have thrown any obstacle in the way of specifying his invention. We had no intention to injure Mr. Wright; *we have not injured him;* but on the contrary, we have no doubt that Mr. Wright will, 'ere long, consider us as his best friend.
"Witness his calling the *break* wheel *a frame and friction-band*, and friction rollers he calls wheels, to support his assertion, that the machine has one hundred wheels; whereas, if he had consulted his own quotations, he would have found it stated, that the machine is without wheel or pinion, and by common acceptance, these terms are only applied to tooth wheels gearing into each other, of which there are not any in this machine."	On reference to our 11th Number, it will be perceived that we are here misquoted; that we only called it a "friction-band," and the word *frame* is an interpolation of the ingenuous commentator. The term *brake* has twenty different meanings, and though its signification is well understood by the engineer, *as applied to cranes*, it would not be understood by every reader; accordingly, we adopted the term "friction-band," that every body must comprehend, as it *explains itself:* it is, besides, technical, mechanical, and evidently much more scientific, than the term "*break*." As to the remaining proof of our ignorance, by our not calling wheels that revolve upon *fixed* axes, *rollers*; to whom, we inquire, does such a charge apply?
"In addition to the great increase of power there is also a great increase of safety, as in lowering with the *break wheel*, the men have so complete a command of the weight, that they can stop the machine at any point they choose."	The "friction-band" or *brake* (not the *break*-wheel) belongs to the old wheel and pinion crane, and Mr. Wright had no more to do with it than we had in the construction of the moon.
"A weight of ten pounds on the winch handle balances and securely holds a ton on the chain, without any kind of locking gear."	Had it been *only an ounce* that balanced a ton on the chain, there would be nothing peculiar or worthy of remark in it. This isolated circumstance, too, is as much a proof of the *in*efficiency of a machine, as of its *efficiency*. An injudicious arrangement of parts, bad workmanship, and

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Reply.

other causes producing great friction, would do this, and yet prove the *inefficiency* of a machine. A long leverage to the crank, or a multiplicity of wheels (which are so many rotary levers), would produce the same effect, and yet *prove nothing.*

"In the complete machine, the crank frame is fitted with a counterbalance weight, by which one man can push (not lift) the machine in and out of gear by one hand, instead of requiring "the utmost power of two men, as stated in "the publication alluded to."

All we can say to this is, that there was nothing of the kind to the machine we examined, in the presence of three other gentlemen, one of whom assisted us in putting it into gear and trying its action.

"On examining the diagram above noticed, it appears to have been *regularly drawn to scale* as far as it goes, and to have been described with an attention to other particulars, which seem to contradict the Editor's assertion that the whole has been done from memory. Indeed, the particulars of so novel a machine could not have been so fully retained by any act of mere memory, and particularly by one who, as far as we can learn, has no pretensions to practical knowledge in mechanical subjects; although he has modestly chosen to elect himself as judge and jury to decide upon the merits of an invention he has only partly seen, and evidently does not comprehend the principles of an invention, which has been brought forward by one whose whole life has been passed in the pursuit of practical mechanical improvements, and whose talent has been patronized, and his inventions sought after by the directors of the largest, most successful, and the best-managed mercantile establishment in England, perhaps in the world (except the East India Company)."

We have a decided disinclination to boast of our knowledge in mechanical subjects; but we may confidently challenge a comparison between the practical information displayed in the London Journal, with that exhibited in the Register of Arts: nor do we profess to give advice to engineers (!) like our learned commentator does in his advertisements, but are contented and grateful to receive information *from* them. The useful knowledge we thus collect, by industry and perseverance, we publish to the world in a *cheap* and *intelligible* form; which excites the opposition we meet with. The task we have undertaken, and do perform to the best of our very humble abilities, is really an arduous one; and the good opinion and friendly feelings of engineers and inventors, so necessary to the success of our work, will not, we trust, be at all influenced by the observations of the London Journal.

Does not our commentator, in asserting that this machine gains both power and speed, take upon himself the office for which he condemns us?

We have but a poor opinion of the mechanical talents of that draftsman, who could not easily make a drawing to scale of Mr. Wright's crane, after a few minutes' observation of the action of its parts. Not a single measurement was taken, except by the eye; and all we required with this, was to notice what proportion the radius of the main wheel bore to the distance between its periphery and the crank axle; having this pretty near the mark, all the other essential measurements follow from necessity; and in making our drawing for the

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	engraver, who was present, we took occasion to explain to him how easy it was to do the same thing, by the exercise of a very little common sense.
"It is to be fairly presumed that the directors of this establishment, after a quarter of a century of practice and success, do really know what they want, and are capable of estimating the merits of machinery intended to facilitate the operations required in the docks. Yet this hypercriticiser of mechanical inventions appears to misrepresent their proceedings, that he may leave himself an opportunity of condemning an invention they have adopted. All these connected circumstances lead to one conclusion, that the author of the article alluded to is either ignorantly or designedly a tool in the hands of some one who has an interest inimical to that of Mr. Wright."	No doubt there is as much talent in the West India Dock directors, as in any other body of well-educated mercantile men; but the question is one most fitting for the decision of a *civil engineer*; and as we have been so mercilessly attacked for giving our honest opinion, we here inquire whether any civil engineer has so far risked his professional reputation as to put his name to a report, in which Mr. Wright's crane is described to have *such properties as those* which the Editor of the London Journal of Arts asserts it possesses?
"Had the author of the article alluded to applied to Mr. Wright, he might have seen the crane at work, and *learnt* particulars of its power and speed, which it is quite obvious the labourers and inferior officers of the West India Docks would not give him, as these people are very jealous of any thing which, by lessening their numbers, may also tend to lessen the expenses of the establishment;	There was no occasion to apply to Mr. Wright to see that which was publicly used at the docks.
and the information must have been obtained there by stealth, and in opposition to the regulation of the directors, who have ordered that no strangers shall see the cranes while being fitted and fixed."	This is a slander that will have to be proved. The crane we drew was fitted, fixed, and in use.
"These facts will, we hope, lead the public to suspend giving credit to crude remarks, apparently arising out of personal animosity. We shall in our next be able to give particulars of a trial which is about to take place by order and under the inspection of the West India Dock directors, in which Mr. Wright's cranes are to be worked against the best common cranes in their establishment; and we have no doubt the result will support our opinion of Mr. Wright's talent and judgment."	We have been furnished by several engineers who were present, with the particulars of the trial alluded to, made on Thursday last, (the 1st Nov.) for publication. That trial, however, having been deemed by Mr. Wright's friends as inclusive, we shall defer the publication of it until an opportunity is afforded of making another comparative trial, that will be more satisfactory to his friends.

DUNLOP'S EXPERIMENTS WITH BOTTLES SUNK INTO THE SEA.

A COMMON porter bottle well corked, pitched over, and secured by a covering of new canvas, also covered with a thick coat of pitch, and also three glass phials, well corked, and the corks firmly secured with leather coverings and sealing wax, were let down 480 feet, and suffered to remain ten minutes. When brought up, the bottle was nearly full of water, and the cork floating inside. The covering of canvas and pitch was pressed concave into the mouth of the bottle, but the pitch was not cracked or broken, The phials were all full of water, and the cork of one of them did not seem to have been displaced, but a bit of sealing wax at its bottom, indicated that it must have been forced in.

Mr. Dunlop at the same time, immersed five small glass globes, hermetically sealed, two of which were as nearly vacuous as they could be made, other two were suffered to cool previous to being sealed, and the fifth contained a small globule of mercury, were immersed to the same depth as in the experiment on the porosity of glass. These globes were brought up uninjured, nor did the one which contained the globule of mercury shew, that the least dampness had penetrated the glass.

With a view to ascertain the temperature of the water at that depth, four small thermometers, constructed to break with a less temperature than 100°. Faht. were immersed with the other articles, and brought up uninjured.

In a subsequent set of experiments, Mr. Dunlop, to guard against the possibility of the corks being forced in, prepared two five-ounce phials, by dipping the corks in strong gum dissolved in ether, thrusting them into the necks of the phials, and suffering them to dry for several days. The corks were then cut close off, covered with several coats of varnish, and covered with leather soaked in varnish, tied firmly round the necks of the phials, which were farther secured, by fitting on brass caps with melted sealing wax. Another phial was prepared by simply thrusting in the cork, cutting it close off, and covering it about a quarter of an inch thick with sealing wax.

These, with the porter bottle prepared as before, and the glass globes and thermometers used in the previous experiments, having been put into a piece of old canvas and a tin case, and secured to the line immediately above the lead, were suffered to remain about eight or ten minutes 1080 feet below the surface of the water.

The two five-ounce phials were crushed to powder, except the necks, which were secured by the brass caps and thick parts of the bottoms. The other small phial, which was of much stronger glass, was not broken, nor was the cork forced in, or the sealing wax broken, but a very minute quantity of water had found its way into the phial, probably through the sealing wax ¼ inch thick, and the cork. Neither the thermometers nor the glass globes were broken, nor was there any appearance of damp in the globe containing the globule of mercury, to indicate the porosity of glass. The porter bottle came up full of water as formerly.

Mr. Dunlop suggests the idea of repeating these experiments with the hydrostatic press, on a strong glass cylinder to shew the progressive effects of the pressure.—*Abridged from the Edinburgh New Philosophical Journal.*

QUALITIES OF THE DIFFERENT KINDS OF COAL,
Indicated by external appearances.

An intense black colour in coals, joined to a high degree of lustre, indicates that they contain a large quantity of carbon, and that the oxygen in them predominates over the hydrogen.

The species of lustre determines the relation of the carbon to the other constituent parts.

Pitchy lustre indicates a smaller proportion of carbon: the passage of this lustre to the semi-metallic, indicates a greater.

Blackness of colour, high lustre, and slight cohesion and hardness, characterize the coals which are rich in carbon, and in which the hydrogen predominates over the oxygen.

A black colour, a dull appearance, and a marked cohesion, with a certain degree of hardness, are signs of the contrary.

When the colour becomes dark brown, it implies that the proportion of the hydrogen has increased with respect to the oxygen.

If, while the black becomes less intense, the aspect duller, the hardness inferior, the cohesion remain the same, it contains still less carbon, at the same time that the oxygen predominates over the hydrogen.—*From M. Karsten's Observations published in the Edinburgh New Phil. Journ.*

SCIENTIFIC INSTITUTIONS.

Deptford Mechanics' Institution.—On Thursday evening, the 1st of November, a meeting of the members and friends of this institution was held for the purpose of formally opening a New Lecture-room, recently built on the premises of the institution, in High-street, Deptford. The room, which is rectangular, is capable of accommodating about 250 members: it was crowded to excess, and many who were desirous of being present could not obtain admission.

The chair was taken about half past 7 o'clock, by the Rev. Mr. Chapman, one of the Vice-presidents, who was accompanied by the other officers and Dr. Birkbeck, who likewise honoured this institution with his presence, and gave his assistance to its formation, about two years ago.

The Chairman, after reading a letter from the President of the society, Dr. Olynthus Gregory, explaining the cause of his non-attendance to be severe illness, gave a short history of the Deptford Mechanics' Institution, from its formation to the present time, which was highly creditable both to its members and managers, as well as to many scientific gentlemen, who had assisted in the instruction of the members, by delivering courses of lectures.

Dr. Birkbeck then, in an eloquent address, pointed out numerous advantages, both general and individual, which had already arisen

from establishments of this kind, now amounting, in this country, to about seventy. The Doctor stated that he had lately visited many of the mechanics' institutions in different parts of the country, and that it was delightful to find that they were all going on successfully; and that, in every instance, their proceedings had been strictly confined to the purposes for which they were founded; namely, the diffusion of useful knowledge amongst their members.

After several other gentlemen had addressed the meeting on the importance of cultivating the mind, and acquiring scientific information, the Chairman announced, that on Tuesday next, at the usual hour, Mr. Downes would deliver a Lecture on the *Magnitude and Motions of the Earth*, and the meeting separated.

Chemistry.

Evolution of Heat during the compression of Water.—M. Arago announced to the Academy of Sciences, that M. Despretz had ascertained experimentally, that the compression of water by a force equal to 20 atmospheres, caused the disengagement of one sixty-sixth part of a degree of heat.

Extrication of Heat by compression of Gases.—M. D. Colladon finds that to ignite amadon, atmospheric air must be reduced to one thirteenth of its volume; and to inflame sulphur, to one eighteenth. Chlorine, by compression, gives a weak violet coloured light.—*Philosophical Mag.*

Green Fire—is made of equal parts of pounded nitrate of carytes and charcoal. This is used in ghost scenes at theatres; it gives out a greenish flame, with a white smoke, and makes the countenance assume a deadly hue.

Useful Arts.

Paper to resist Humidity.—This process, which is due to M. Engle, consists in plunging unsized paper once or twice, into a clear solution of mastic in oil of turpentine, and drying it by a gentle heat. The paper, without becoming transparent, has all the properties of writing paper, and may be used for the same purposes. It is especially recommended for passports, workmen's books, legal papers, &c. When preserved for years it is free from injury, either by humidity, mice, or insects. It is further added, that a solution of caoutchouc will produce even a better effect.—*Kunst und Gewerbe-blalte.*

Fire and Water-proof Cement.—To half a pint of milk put an equal quantity of vinegar to curdle it; separate the curd, and mix the whey with the whites of four or five eggs, beaten well together; then add quick-lime through a sieve, until it has acquired the consistency of a thick paste. This is an excellent cement for crockery, and dries quickly.

Wedgewood's Black—is thus prepared. One part animal

charcoal, and seven parts of fir charcoal, are to be pulverized and mixed well together, when a vase of any shape, made of baked porcelain called biscuit, not varnished, is put into a clay mould, or a vessel of cementation that resists fire. This mould is entirely covered with pulverized charcoal, so as to surround it on every side: it is then closed with a lid, and exposed to a heat for three hours, after which the whole is left to cool. On opening the mould, the porcelain figure is found perfectly preserved, and of a fine black grey colour, the same as Wedgewood's.

CEMENTATION OF IRON BY CAST IRON—Pure iron, when surrounded by, and in contact with, cast iron turnings, and heated, is carbonized very rapidly, so as to harden, to temper, and, in fact, to exhibit all the properties of steel. M. Gautier finds this a very advantageous process in numerous cases, especially where the articles to be case hardened or converted into steel, are small, as iron wire, or wire gauze. The temperature required is not so high, as that necessary in the ordinary process of cementation, and the pieces to be carbonized are not injured in form. The kind of cast iron used, should be the grey metal, and the more minutely it is divided, the more rapid and complete is the operation. By covering the mass of cast metal, in which the iron to be carbonized is enveloped, with sand, oxidation, from contact with the air, is prevented, and the cast metal may be used many times. Plumbago experimented with in the same manner, does not produce the effect.—*Jour. de Pharmacie*, 1827. *p.* 18.

Music.

THE APOLLONICON.—Our intelligent correspondent, Mr. C. Davy, has informed us, that several improvements have been recently made in the Apollonicon, to which some very ingenious mechanical movements have been applied, and which, through his kindness, we hope soon to be able to lay before our readers.

NEW PATENTS SEALED.

LIQUOR COCKS.—To J. and T. Hall, of Leeds, for improvements in metallic cocks for drawing off liquids. Sealed 11th Oct. To be enrolled by 11th April, 1828.

ROOFING.—To Elias Carter, of Exeter, for a new covering for the roofs of houses and other buildings. 11th Oct. Enrol. 11th April, 1828.

HOLLOW CYLINDERS.—To Josh. Horton, of West Bromwich, Staffordshire, for improved methods of making iron and steel hollow cylinders, guns, retorts, &c. 11th Oct. Enrol. 11th April, 1828.

LOCOMOTIVE ENGINES.—To Goldsworthy Gurney, Esq. of Argyll Street, for improvements in locomotive engines, &c. 11th Oct. Enrol. 11th April, 1828.

SUGAR AND MOLASSES.—To James Stokes, of Cornhill, London, for improvements in preparing raw sugar and molasses. 11th Oct. Enrol. 11th April, 1828.

WINDOW SASHES.—To John Wright, of Princes Street, Leicester Square, for certain improvements in window sashes. 11th Oct. Enrol. 11th April, 1828.

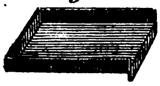
TO OUR READERS AND CORRESPONDENTS.

The drawings of J. R.'s models are in a forward state: they will be finished next week.

Our regular article on "Foreign and British Machinery" is unavoidably omitted this number; their uniform continuation will not, we trust, be often interrupted.

W. W.'s second favour is received.—HONORIUS must have sent to us by mistake.—Let A MANUFACTURER try naptha in the place of oil.

Fig. 1



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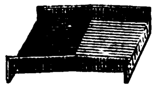

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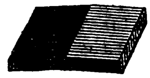

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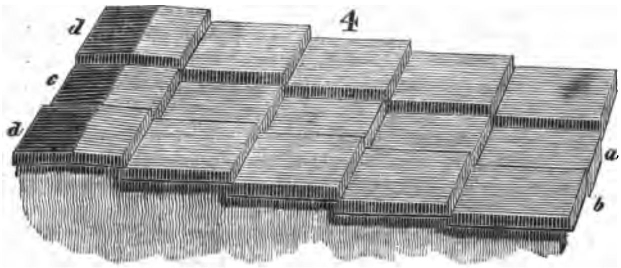

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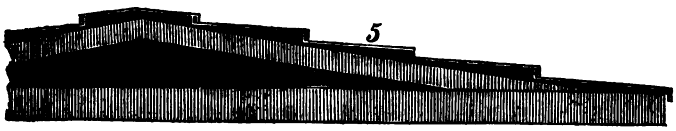

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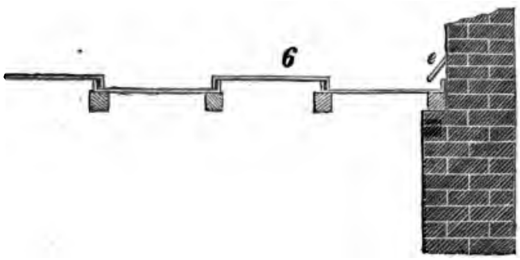


PATENT CAST IRON ROOF PLATES.

By Mr. Elias Carter, of Exeter, and Toll End Furnaces, Staffordshire. *Sealed* 11*th October*, 1827. [*Not yet enrolled.*]

For elegant combinations and architectural ornament in building, the antients are perhaps still unrivalled; but as respects convenience, economy, and utility, the moderns have unquestionably far surpassed them.

In a late* number we gave a description of Mr. Smart's *improved* "bow and string" rafter, which we characterized as one of the

* No 2, new Series.—See also No. , first Series.

greatest improvements, made in the art of building in modern times: and we have now the satisfaction of recording another improvement, which, while it most happily harmonizes with that invention, forms also an excellent accompaniment to it.

In the construction of roofs, the desideratum consists, we humbly conceive, in combining, with the utmost economy of materials, durability, lightness, and impermeability to moisture. As respects the *carpentry* of a roof, we know of nothing equal to Mr. Smart's contrivances, especially for those which are made nearly flat, or wherein the inclination is but small: and, as regards the *coverings* for roofs generally, but more particularly those of the latter description, we confidently believe the new patent cast iron plates which we are about to describe, will, in most cases, meet with a decided preference over the ordinary materials used for that purpose.

The inventor is a Mr. Elias Carter, late of Exeter, but now of the Toll End Furnaces, Staffordshire, where a regular manufacture of the plates is, we understand, already established, in consequence of a considerable demand for them having followed their first exhibition.

The plates are *cast* about three-sixteenths of an inch thick, and two feet square, (i. e. containing four superficial feet,) clear of lappings, with flanges of two inches; twenty-five of them, therefore, cover *a square* of one hundred feet. As a matter of taste or convenience, these dimensions may be varied, but the above may be considered as the most economic, and the *general* size. The weight will be about ten pounds per foot, or one thousand pounds per square. If made of a larger size, an increase of thickness will be required, which will, of course, cause an addition to the weight: the forms of them will be best understood by reference to the annexed engravings.

Fig. 1, a plate with three flanges or laps turned up, and one turned down, and is called "*the roof plate*:" this form being used for the covering of the roof generally, excepting the ridge or centre row. Fig. 2, a plate cast with two raised sides, and two sides depressed, and is named "*the lower ridge plate*." Fig. 3, a plate cast with the four sides turned down, and called "*the upper ridge plate*." Fig. 4, a bird's eye perspective view of a portion of a roof, as covered with the patent roofing. The row of plates marked *a*, is composed with the roof plate, as seen in the drawing Fig. 1. The rows of plates marked *b* are also made with the plates Fig. 1, but placed in a position the reverse of that figure. The plate marked *c* is the lower ridge plate Fig. 2, and the plates marked *d* are the upper ridge plates described by Fig. 3. Fig 5 is a section, shewing the inclination of the plates, and the use of the flanges, by which drips are formed. The inclination need not exceed half an inch to the foot, and, with the drips, will together comprise a fall of 1½ inch to one foot. Fig. 6 is a section, at right angles with the preceding. When the roof is constructed within parapets, the gables may finish with the plates in the position of *a*, Fig 4, with a rail or drip fixed to the parapet, as at *e*, Fig. 6. In the construction of pent-house roofs, the ridge plates are not required.

We agree with the patentee in opinion, that these roof plates will require no fastening, and that their weight and peculiar construction will secure them against high winds; but should any architect (otherwise disposed to adopt or recommend this mode of covering) be doubtful of their security in this respect, he proposes to cast a ring or loop into the under side of the plates forming the row *b*, Fig. 4, by which, with the addition of a hook or chain to each plate of this row, they can be fastened to the rafter. It must be obvious that the upper rows effectually secure the under.

The effect produced by the simple and regular form of the parts composing this covering, is peculiarly pleasing to the eye, which is relieved by the light and shade produced by the alternate projection, the apparent thickness, and the gradation of the plates. It also presents a field for the display of architectural taste, in such buildings of classical design, as require that a participation of ornament be continued to the roof; or, that this part of the building be totally concealed from view. It is particularly well calculated for the Grecian style of architecture, which requires the roof of a lower angle than can safely be given with any other than a metallic covering. The expense, compared with lead, is scarcely more than one third, and, deducting the charges for close boarding, indispensable for lead, which may be omitted altogether in the mode of covering proposed, the cost may be fairly quoted as not more than one third the expense of lead.

It is worthy of remark also, that by the expansion and contraction of metals in all changes of temperature, lead is very liable to fracture, and particularly so when confined, or laid in long sheets; but Mr. Carter's patent roofing being divided into figures of equal dimensions, the expansion and contraction is so equally diffused, and its quantity so divided, that no fracture can possibly happen from such cause.

Taking into account the quantity of lead used on slate roofs, upon the ridges and angles, also the charges for laths, copper nails, &c. &c., particularly on buildings of large dimensions, in which the double or M roofs are required; considering also the saving of materials in the diminished surface, occasioned by the low angle, the iron will not be of more cost than a covering of the best slate, over which it has likewise the advantage in being of lighter weight, as exhibited by the following table.

Comparative Weights of different Roof Materials, as extracted from Mr. Tredgold's valuable Work on the strength of cast iron.

Copper	100	lbs. per square of 100 feet.
Lead	800	—
Large slates	1,120	—
Ordinary ditto	900	—
Ditto	500	—
Stone slate	2,380	—
Pan tiles	1,780	—
Ditto	650	—
*Weight of Carter's patent iron covering	1,000	—

The slate roof may be calculated to last about fifty years; at the end of that period the old slate will be of no value, although the iron will in that time be scarcely deteriorated, and, in case of the final destruction of a building, the material, as old iron, will be worth nearly one half of the original cost.

PATENT PROCESS IN DYEING HATS.

By Arnold Buffum, late of Massachusets, but now of Bridge Street, London. *Enrolled* Aug. 1826.

The object of the patentee is to prevent hats, while undergoing the dyeing process, from being pressed against each other, or against the sides of the bath; to have them frequently dipped, and to expose them alternately between each dip, to the influence of the atmosphere, for the space of a few minutes.

To effect such an operation mechanically, the patentee proposes two distinct contrivances, either of which may be employed.

By one of them, the hats to be dyed are suspended upon pegs in the periphery and sides of a large circular frame, which is made to revolve *very* slowly upon its horizontal axis, with one-half (nearly) of the frame immersed in the dye liquor, contained in a vessel of a figure and capacity adapted to receive it, without the suspended hats coming in contact with its sides; or instead of the frame slowly *revolving continuously*, it may remain *at rest* for ten minutes, and be turned half way round each successive ten minutes, so that the hats may be alternately immersed in the dye, and exposed to the atmosphere.

By the other method, the hats are placed upon a square frame, which is wholly submerged in the dye bath (also of a square figure) during the required period; then drawn up out of it by means of a pulley or crane, and exposed for a similar time, repeating the operation until the dyeing is completed; which, it is said, is very much facilitated by this process, and that the intensity of the colour is considerably improved, by imbibing the oxygen of the atmosphere, owing to the frequent and alternate dippings and exposures.

PATENT PORTABLE OVEN,

By W. E. Cochrane, of Regent Street. *Enrolled, May* 1826.

This invention (if it can be termed such), merely consists in the application of an oil lamp to the heating of an oven, instead of the ordinary fuel. The oven is of the common kind, having an outer case or jacket, for the conveyance of the heated air around it. The whole novelty claimed in this matter is, therefore, in the application of a lamp to a common double cased oven, instead of the customary fuel. Query: is not the fuel, that is to say, the inflammable part, much the same in both cases, namely, carburetted hydrogen gas? If nobody but the Patentee, or those he licences, may heat their ovens by the inflammation of oil, it is a monopoly with a vengeance!

PATENT IMPROVED STOVES AND GRATES.

By Edmund Lloyd, of Fulham. *Enrolled, April* 1826.

This improvement consists in the adaptation of a box in a recess at the back, of an ordinary register or other stove, for the reception of sufficient coals for a day's consumption; which are to be drawn forward into the fire as they may be wanted, and thus supercede the use of the coal scuttle, a utensil which has certainly its inconveniences.

That this operation may be performed with facility, the box at the back of the stove is closed with a sliding door, the weight of which is supported by a counterbalance suspended over a pulley; it is therefore drawn up or let down with ease, by means of a small handle conveniently situated, when the coals may be raked on to the fire by means of the poker. We have seen many of these stoves at the ironmongery warehouse of Messrs. Paynter and Hawke in the Strand; their convenience is too obvious to need any further remark.

BARTON'S METALLIC PISTONS.

We have already, in Vol. 3, p. 169, described and spoken favourably of these pistons; and, in consequence of some attempts to depreciate their value by a correspondent in a respectable contemporary periodical, we have, since the receipt of the following letter, made inquiries respecting the working of them at the Thames Tunnel, and find, that about the beginning of the present year, Mr. Brunel had the metallic pistons. made by Maudsley, removed from his engine (used in pumping the water, removing the earth, &c. from the excavations,) and Barton's pistons and stuffing-boxes put in their stead. Since that time the engine has been at work day and night, with the exception of the short time the works were suspended by the breaking in of the water. These pistons have been found to answer the purpose for which Mr. Brunel had them put in; and we were informed that the saving in fuel and repairs has been considerable. There are two boilers to the engine, which were *both* required to supply *steam* before the pistons were changed; and since that, *one* has been found sufficient.

The letter appears to be written by a friend of the patentee; but the statements made in it are, we believe, strictly true.

Sir,—As the pages of your valuable journal are ever open to give publicity to those inventions and discoveries in the arts which have been proved to be highly beneficial to the community, I have taken the liberty to address you the following observations.

I felt considerable pleasure yesterday, on visiting the intended Tunnel under the Thames, to find that the works were proceeding rapidly, and that the engine was working with half the coals that were formerly consumed. This, the engineer and others employed there, informed me, was owing to the application of Barton's patent pistons, slides, stuffing-boxes, &c., which had been in use nearly

twelve months, and by which nearly all stoppages and repairs were obviated. I likewise made inquiry at St. Katharine's Dock, where his patent pumps are in use for drawing the water from the excavation, &c. and I was informed, that they raised considerably more water than the common buckets, without requiring one tenth of the repairs and stoppages. I also find that they are used in his Majesty's dockyards, in several mines, and other concerns of the first magnitude, and invariably give the greatest satisfaction. Till lately I had but a slight knowledge of these inventions, but on entering fully into their merits, I found them of the greatest importance. It has often been remarked, that the metallic piston is of no advantage to the steam-engine, and that it is always getting out of repair: this, I am aware, is the case with several, on principles differing from Barton's, but which I believe never has been the case with his, having minutely inquired, and inspected several that have been constantly in use for seven or eight years, which is certainly a pretty clear proof. From the appearance of those pistons, after having been in use for so long a period, I am of opinion they will last, in perfect order, nearly as long as the engines themselves. Indeed, I am fully convinced, that the wedge piston is the only one of the metallic kind that is beneficial or useful.

This invention, like all others of real worth, and which clash with great interests, has been opposed and pirated, to the serious injury of the patentee; and I therefore trust you will lay this slight sketch of its advantages before the public, I am also fully persuaded that Mr. Barton's improvements on steam-engines, steam-vessels, and pumps, excel any that have appeared for many years, for general utility.

I intend, at an early period, to furnish you with every particular relative to this and other metallic pistons, conceiving it would be generally interesting to your numerous readers.

I am, Sir, with great respect,

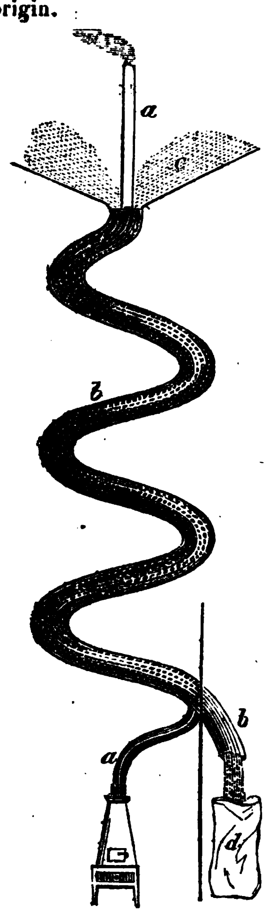
W. W. a Constant Reader.

Oct. 26, 1827.

APPARATUS FOR SPEEDILY DRYING MILDEWED CORN.

Owing to the imposition and quackery of some of our contemporaries, we consider it but just to ourselves to state, that we have during the four preceding years, described in the Register of Arts, anonymously (under the Signatures of L. H. H. L. Pro Bono Publico, &c.) more than fifty of our own humble inventions. Several of these, with slight variations, have since become the subject of patents: in describing which, in the course of our work, we have repeatedly proved this by referring to the original articles. For this acknowledgment, we dare say our contemporaries will indulge in a laugh against us, to which they are perfectly welcome; but we now announce to them, that they shall not rob us any more of the results of our lucubrations, without receiving the exposure and castigation they merit.

In several of the French papers we lately noticed a description of a *new* apparatus for the above-mentioned purpose, which was claimed as the invention of M.—(somebody, whose name we forget) and it was announced as having been very successfully used in a certain *departement.* On reading it, we could not forbear smiling at the impudence of the French varlet, and the matter would have received no further notice from us, had it not been transplanted back again into our English periodicals, and there announced as a *new* and important French invention. Now it happened that the words of the French account were almost a literal translation of the English; in resuming therefore the English dress, the words re-appear with scarcely a variation; which leaves not the slightest doubt of its origin.



The contrivance in question was described by us more than two years ago (in No. 53, first series); the account of it includes many observations on the means and importance of thoroughly drying grain, which it would be too long to extract, our readers will however excuse us for inserting merely the abbreviated description, (which is still going the rounds of the periodical press as a new *French invention*), together with the original engraving of the subject.

"*New Invented Apparatus for speedily Drying Mildewed Corn.*"

"This excellent apparatus consists of a long spiral metal tube, like a distiller's worm, reaching from the basement to the upper floor, and through the roof of the granary, which forms a passage for the heated air from a close stove below. Externally round this tube is placed another tube, winding like the interior one in a spiral direction, and at about an inch and a half apart from it. This external tube receives the corn from a hopper above, and is punched throughout with numerous small holes, through which the vapour escapes, as it is formed, by the damp corn coming in contact with the enclosed heated chimney. The corn in consequence becomes thoroughly dried before being discharged at bottom, without the intervention of any manual labour.

MECHANICS' MAGAZINE.

When in our last number we exposed the inconsistency and nonsense contained in the Technological Repository, and the London Journal of Arts, we little expected that we should have to exhibit a similar tissue of absurdities, on the same subject, in the Mechanics' Magazine (No. 220), for we had always regarded the latter work however deficient in *useful* mechanical information and originality, to be nevertheless superior in these respects to the two former works. We must, however, acknowledge ourselves completely mistaken, and consider the editors of the works in question as a trio of geniuses in full hue and cry after that acme of mechanical inconsistency, the *perpetual motion,* hitherto confined to the imaginations of visionary schemers, ignorant of the first principles of physical science; for, in addition to what has been advanced by the above-mentioned works, the editor of the Mechanics' Magazine, in speaking of Mr. Wright's crane, says, "That however paradoxical it may seem to dogmatisers in science, *both power and velocity are gained* by the new combination." When a man (and a literary man too) takes upon himself thus to treat with scorn the immutable laws of motion, as taught by every philosopher who has given his attention to the subject, and demonstrated by every machine which the art of man has constructed, and denominates us *dogmatisers in science,* because we advanced those laws in support of our opinions with respect to Mr. Wright's crane, we cannot help asking whether it be the same editor who has conducted a work addressed to the mechanics of Great Britain through eight volumes? Can it be that the editor has adopted the politic maxim of the shrewd quack doctor, and proposes, like him, to administer exclusively to the larger portion of mankind?

The editor states that he was present at a trial of Mr. Wright's crane at the West-India Docks on the 1st of November, and gives a long detail of what took place; but he either describes what he did not see, or saw what others did not see on that occasion. The most remarkable part of this statement, is, that a man by turning a roller with a handle, can do only half the work which he can accomplish when assisted by the wheels and pinions of the common crane, and only one-fourth of that which he can accomplish with Mr. Wright's crane.

Now, as it must be evident to any person possessing the least information on the subject, that a man "with a simple roller and handle," as it is termed, can raise a *greater* weight in a given time, than with "*all the additional assistance afforded by the wheels and pinion of the common crane,*" what a state are those persons placed in, who look to this editor for scientific information; to him, who asserts that both *power* and *speed* may be gained by *increasing* the parts of a machine. Reports of the trial alluded to, have been furnished to us by several parties perfectly disinterested, but at the request of Mr. Wright we refrain from publishing them at present: indeed, the construction of the cranes is such, as to render a trial to determine their respective merits perfectly unnecessary, for a person at all acquainted with machinery could estimate their respective powers in

a few minutes. Probably the trial was instituted to determine their respective strengths, and not their power.

If the editor of the Mechanics' Magazine dissents from the proposition *that no power can be gained in machinery but at the expense of velocity*, let him demonstrate its fallaciousness instead of calling us "dogmatisers in science" for maintaining it; but we feel assured that he will be so much ashamed of his observations, that he will be anxious to let the matter drop, and remain silent on this subject.

COMPARATIVE VIEW OF

FOREIGN AND BRITISH MACHINERY

AND PROCESSES IN THE ARTS.

CEYLON. N°. IX.—[Continued from page 189.]

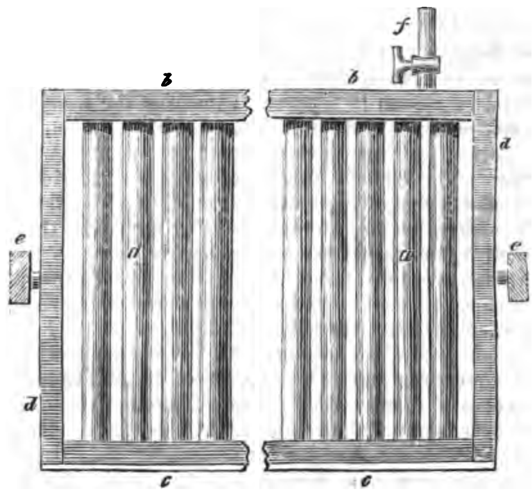
The rectification of spirits on the large scale, is usually effected by repeated and careful distillations, in stills of smaller magnitude than those first employed to separate them from the fermented wash. Thus is formed what is commonly termed *spirits of wine*, which still contains a portion of water, that cannot be wholly got rid of by re-distillation. The chemist therefore, who has occasion for absolute *alcohol*, makes use of some alkaline salt, (such as the carbonate of potass,) which, having a greater affinity for water than alcohol, combines with it, and leaves the alcohol nearly pure.

Instead, however, of mixing the alkaline salt with the spirit, as in the former case, another process has been adopted in France, which is particularly described in our 3d vol. page 157, first series. This process consists in placing a quantity of the dry muriate of lime, or other deliquescent salt, in a series of large shallow covered vessels, placed one over another; inside of each of these, is another shallow vessel of smaller dimensions. In the upper internal vessel, is placed the diluted spirit to be concentrated: the external vessels being perfectly closed and luted, they are left for a day, for the deliquescent salt to attract and imbibe the water from the spirit. The salt being saturated, a cock is opened, by which the spirit, considerably increased in its strength, descends into a similar vessel beneath, which is charged as the former, with the dry muriate of lime. The concentration of the spirit being here further increased, it is allowed to flow into a third, fourth, or fifth vessel, in a similar manner, the last of which raises the spirit to perfect alcohol. The operation is thus performed wholly in the *cold*, i. e. without the application of any artificial heat whatever.

The strongest alcohol may however be obtained, by another, yet rather dilatory process, as it has hitherto been practised. It is, to put the spirits into bladders, and suspend them in a warm room, or over a heated sand bath. Now, as bladder is pervious to water, and impervious to alcohol, the former passes out, leaving only the latter remaining, in a highly concentrated state. In a few days, the diluted spirit thus exposed, loses one fourth of its volume.

We have never made this experiment ourselves, but the fact being supported by the concurrent testimony of many respectable

chemists, we have no doubt of its truth. On account of the little heat necessary to effect this rectification, we cannot help thinking that it may be made one of great economy, if an apparatus can be devised for conducting the process extensively, and with little labour. For this purpose we would suggest, that instead of the ordinary animal bladder, the æsophagus of oxen, (the buffalo, or the elephant, in India,) be employed, as exposing a larger surface to the air, and as being more convenient for adapting a series of them to a suitable framing, which we propose to be suspended upon pivots, in a heated apartment; or in warm climates, to the heat of the sun. The following diagram will explain what we will take leave to call (though not strictly correct) a



BLADDER RECTIFYING APPARATUS.

a a are the æsophagus bladders, distended between a framing *b b*, and *c c*, which is exhibited as broken away towards the middle, to denote that it may be made of any convenient width or length. The bars *d d* connect the upper and lower pieces, and carry the pivots or axles, which turn in the cross beams or supports *e e*, shewn in section. The upper side of the frame *b b*, is intended to be formed of a square or round *tube*, in which are made circular apertures for the reception of the upper ends of the bladders, *a a*, which are to be kept open and distended by wooden rings, and properly secured by cement. The lower ends of the bladders pass through similar apertures in the bottom rail, where they are cemented, and kept closed up, and secured from injury by a board screwed over them into the rail *c c*.

We will now suppose that fifty (or any other number) of such bladders, are fixed to a frame, and charged with diluted spirit, by means of a moveable hose and nozzle, leading into the tube of the open cock *f*; that done, the cock *f* is to be closed. In the same

manner, let all the other frames in the apartment or manufactory be charged, of which there may be any number. If 100 frames, there would be 2 or 3000 gallons suspended, which may then be submitted to a moderate heat, no matter whether that of the sun or a stove. A building on the plan of a green-house or hot-house, would answer for both purposes.

When it is found that the spirit has parted with its aqueous fluid, in any of the frames, they are to be turned half-way round on their pivots, by which the upper side *b b* becomes the under, and the cock being opened, the concentrated spirit may be discharged by means of a hose, into suitable recipients.

It is obvious, that by some such simple arrangement, the whole work of charging and discharging the apparatus of a very extensive manufactory, might be accomplished by a single individual, with very great facility, and without subjecting the bladders to any sensible wear for a considerable period. We shall here quit this subject, leaving others to improve upon the hints we have thus submitted to the consideration of our readers.

We shall now commence the fulfilment of our pledge, to give a description of several of the most celebrated French stills. It appears that previous to the present century, the process of distillation in France, was conducted in a similar manner to that of our distillers, who are not permitted, under the present absurd and oppressive excise laws, to avail themselves of the discoveries and improvements of modern times.*

ADAM AND DUPORTAL'S STILL.

The improved system of distillation adopted by the French, originated, it is generally believed, with an obscure individual of the name of Edward Adam; though this fact was disputed by M. Solimani, professor of natural philosophy at the central school of La Gironde, who affirmed, that he had communicated the plan to Adam. However that may be, it seems to be admitted, that Adam first put it into practice, whose apparatus (as probably improved by his colleague Duportal) is thus described by Dr. Ure, in his valuable chemical dictionary, page 140.

M. M. Adam and Duportal have substituted, for the re-distillations used in converting wine or beer into alcohol, a single process

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* On the subject of the excise laws the able editor of "THE CHEMIST" observes, (vol. 1, page 444;) "While they exist, it is impossible to introduce these new methods into our country; so that we have to thank them for being compelled to drink bad spirits, at a dear rate. It is well observed by Chaptal, that 'industry can only develope all its resources, by having the 'power to try, and to make use of every possible method.' Nature, be it observed, bestows this power; but man, blind, beetle-eyed man, takes it from his fellows. And as long as the manufacture of spirits is restrained and regulated by a system conceived in ignorance, and executed with severity,—as long as the manufacturer must guide himself, not by chemical knowledge and the reason of the thing, but by these regulations,—so long will the manufacture of ardent spirits, be behind the other manufactures of this country."

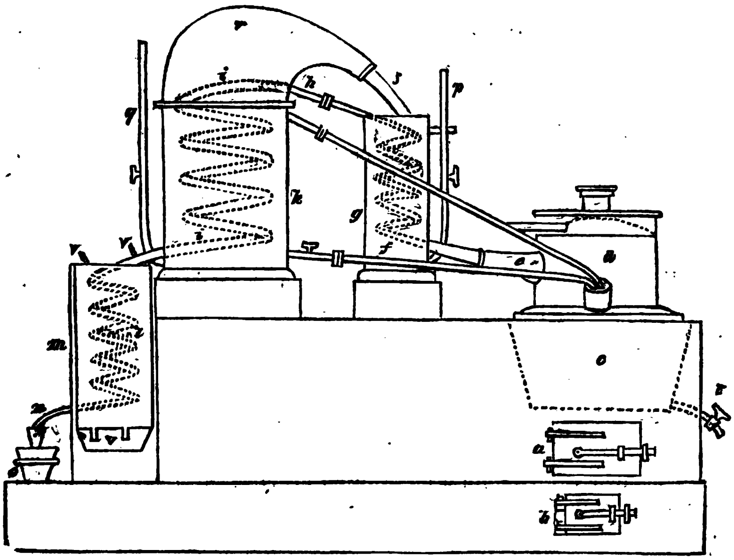
of great elegance. From the capital of the still, a tube is led into a large copper recipient; this is joined by a second tube, to a second recipient, and so on through a series of four vessels, arranged like a Woolfe's apparatus. The last vessel communicates with the worm of the first refrigeratory. This, the body of the still, and the two recipients nearest to it, are charged with the wine or fermented liquor. When ebullition takes place in the still, the vapour issuing from it communicates soon the boiling temperature to the liquor in the two recipients. From these the volatile alcohol will rise, and pass into the third vessel, which is empty. After communicating a certain heat to it, a portion of the finer or less condensable spirit will pass into the fourth, and thence, in a little time, into the worm of the first refrigeratory. The wine round the worm will likewise acquire heat, but more slowly. The vapour, that in that event may pass uncondensed through the first worm, is conducted into a second, surrounded with cold water. Whenever the still is worked off, it is replenished by a stop cock from the nearest recipient, which, in its turn, is filled with the second, and the second from the first worm tub. It is evident from this arrangement, that by keeping the third and fourth recipients at a certain temperature, we may cause alcohol of any degree of lightness, to form directly at the remote extremity of the apparatus. The utmost economy of fuel and time is also secured, and a better flavoured spirit is also obtained. The *arrière gout* of bad spirit can scarcely be destroyed by infusion with charcoal, and re-distillation. In this mode of operating, the taste and smell are excellent from the first. Several stills on the above principle have been constructed at Glasgow, for the West India distillers, and have been found extremely advantageous. The excise laws do not punish their employment in the home trade.*

BERARD'S IMPROVED STILL.

THIS invention consisted in the application of a lofty neck and head to the body of a common still, which being exposed to the cooling influence of the air, a considerable condensation took place in those parts, but the liquid thus reformed was not permitted to run back immediately into the boiler, but to fall upon partitions, with raised ledges, so that the ascending vapour had to traverse over the successive layers of fluid in the partitions, and became for the most part, condensed in its passage, the strongest or purest spirit only passing beyond the head. A more particular description of Berard's method is here unnecessary, as we shall soon have occasion to shew the subsequent improvements made by Cellier Blumenthal and M. Derosne, in which they are introduced. Previous to which, we shall describe the still of Professor Solimani, as it has a priority in date, and partakes more of Adams and Duportal's method.

* Neither would the wise excise laws permit the use of our improved still, so we published a description of it, for the benefit of foreigners, who, we learn, have already availed themselves of its advantages. EDIT.

SOLIMANI'S STILL, AS IMPROVED BY CURADAU.



a is the door of the furnace, *b* the ash hole, *c* the boiler, with its large cylindrical head *d*; *e* the exit tube for the vapours, connected by a union joint to the worm *f* in the tub *g*. This tub is kept filled with water, at a temperature of about 180° Faht., and the spirituous vapour that passes upward through the worm *f*, along the tube *h*, then descends through the worm *i i*, surrounded with wine in the vessel *k*, where it becomes condensed; the liquid spirit then runs through another worm *l*, surrounded with cold water, which completely cools it, before it is discharged by the pipe *n* into the recipient *o*.

To prevent the water from becoming too hot in the tub *g*, by the passage of the heated vapour through the worm *f*, and to preserve it at an even temperature, cold water, from an elevated cistern, is introduced at the bottom by a pipe *p*, the quantity being regulated by a stop cock; and the wine which surrounds the worm *i i*, in the tub *k*, is supplied from a vessel above by means of the pipe *q*. This wine, in the course of distillation, grows hot, it is therefore used to charge the still as often as the former charge is worked off, and the spirits drawn off by the cock *t*; and as it is economical to take off the hottest portion, the cock in *q* is opened, when the cold wine from the cistern above enters at the bottom of *k*, and forces the upper or heated portion along the pipe *u*, into the boiler of the still. The spirituous vapours formed in the tub *k*, are conducted by the head *r*, and the curved neck *s*, into the worm *f*, where it takes the course of the vapours which proceed from the still. The tub *m* is kept as cold as possible, by an ingenious contrivance of Mr. Curadau's. A

number of spiral pipes surround the tub on the inside, the ends of only two of which are shewn in the figure, to avoid confusion. Now as the upper part of the tub is always the warmest, a current of air is produced in these pipes, which serves to cool the water in which they are placed.

The worm *f* being surrounded with a medium at so high a temperature as 180°, only allows of the alcoholic portion of the vapour to ascend through it, the aqueous part running back into the still; so that spirits may, by this apparatus, be obtained of great strength by a single operation.

We cannot however join in the lavish encomiums bestowed by some writers upon this still: there is a want of simplicity in the arrangements, and we cannot discover of what use it is to cause the vapour from the wine vessel *k*, to pass through the worm *i* in the same vessel; it can answer no purpose but to check the progress of condensation, where it ought to be accelerated. It would be much better, in our opinion, to convey the vapour from *r*, at once into the refrigeratory *l*.

Our next will contain a description of Derosne's still, which is the best French apparatus for the purpose that we are acquainted with.

FRENCH LIQUEUR STILL.

Paris, 11th Nov. 1827.

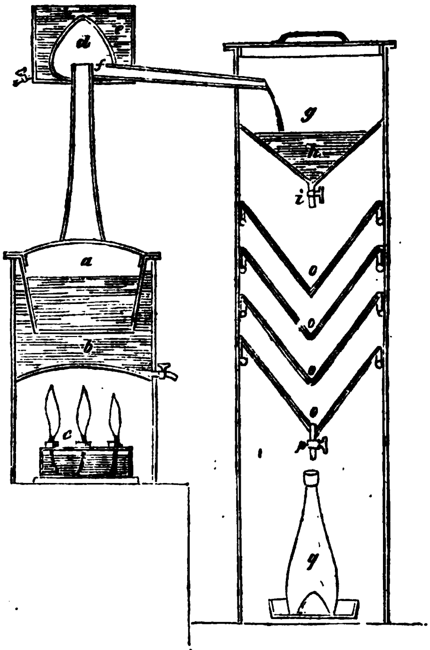
SIR,

As you are at present discoursing on the subject of distillation, probably the annexed description of a small apparatus used in this city for distilling liqueurs for the table, may not prove unacceptable to my fellow readers of your interesting magazine.

CHAS. AUGN. ROBINEAU.

a is the boiler (containing the diluted spirits and flavouring spices), immersed in a water bath *b*, and heated by a spirit lamp *c*, having several wicks. The still has a tall neck, surmounted by a head *d*, which is surrounded by cold water, forming the refrigeratory.

The vapour, as it is condensed, runs down the sides of the head in a liquid form, and is received in a circular channel, formed around the upper extremity of the neck: from thence it flows along a pipe through the cold water cistern, into a recipient *g*, fixed above a series of funnel shaped filterers. Previous to commencing the process of distillation, the recipient *g* is provided with a sufficient quantity of syrup (solution of white sugar), to form the intended liqueur, over which the condensed spirit discharges itself. When all the spirit is come over, the distillation is stopped by extinguishing the lamp; the cock *i* is now opened, when the aromatic spirit and the syrup descend into the first of the filterers *o o o o*. These filterers are each composed of four distinct substances or layers; the lowest



is of perforated metal, the next above fine flannel, over which is put two thicknesses of filtering paper. The spirit and the syrup become intimately blended in passing through these successive filterers, and is received into bottles beneath in a perfectly bright and clear state.

SCIENTIFIC INSTITUTIONS.

London University.—List of Professors appointed,—continued from page 45.

Chemistry. Edward Turner, M.D. F.R.S.E. &c. of Kingston, Jamaica.

Roman Language and Literature. Rev. John Williams, A.M. late of Baliol College, Oxford.

Royal Society.—Sir Humphrey Davy has resigned the Presidency of this Society, and Mr. Davies Gilbert has been appointed provisionally until the regular time for electing the officers, the 30th of this month.

London Mechanics' Institution.—At the conclusion of Mr. Wallis's sixth lecture on *Astronomy*, on the 16th November, it was announced to the members that his course would extend to seven lectures, and be concluded on Friday the 23rd November; and that on November 28, Dr. Birkbeck would deliver a lecture on the *Antient and Modern Methods of preserving Animal Substances*; and on November 30, Mr. Partington would deliver a lecture on *Friction*,

and the best Means of diminishing its Effects on Machinery. It was also announced that the time of receiving models, to be put in competition for Dr. Fellowes's prize for the present year, had been extended to the 1st of December ensuing.

Western Literary and Scientific Institution.—On Thursday last it was announced that Mr. Stackhouse will conclude his course of lectures on *Architectural Antiquities* on the 24th of November; and Mr. Wallis will commence his astronomical course on the 29th of November.

CUBIC EQUATIONS.

The following method of solving certain cubic equations, has been discovered and published in the Times newspaper, by William Frend, Esq. late actuary of the Rock Insurance Office.

$$\text{Let } x^3 + px^3 = y^3$$

represent an equation in which p and y are given in numbers. Then to find x I adopt the following process:—

Divide p by y, and reduce the resulting fraction to its lowest terms. Call the denominator

$$n + 1, \text{ and let } a = \frac{ny}{n+1}$$

$$\text{Then } x = \frac{a}{n}$$

INSTANCES.

Let $y = 12^3$ then p has the following values:—

42 104 189 430 1727

Divide these numbers by 12, and the result is

$3\frac{1}{2}$ $8\frac{2}{3}$ $15\frac{3}{4}$ $35\frac{5}{6}$ $143\frac{11}{12}$

The values, then, of $n + 1$ are, respectively,

3 3 4 6 12

And those of n, consequently,

1 3 3 5 11

The values of a are, therefore, respectively,

6 8 9 10 11

The values of x or $\frac{a}{n}$ are therefore, respectively,

$\frac{6}{1}$ $\frac{8}{2}$ $\frac{9}{3}$ $\frac{10}{5}$ $\frac{11}{11}$

Or

6 4 3 2 1

and these numbers substituted for x will solve the different equations, having the first given numbers for p.

The solution is evidently found on a fixed relationship between p and y, in terms of n and a; and the steps which led to the discovery of it, would occupy too much space at present; but if the attention of the scientific should be drawn to the subject, it shall hereafter be given.

Correspondents will be replied to in our next.

Fig. 1.

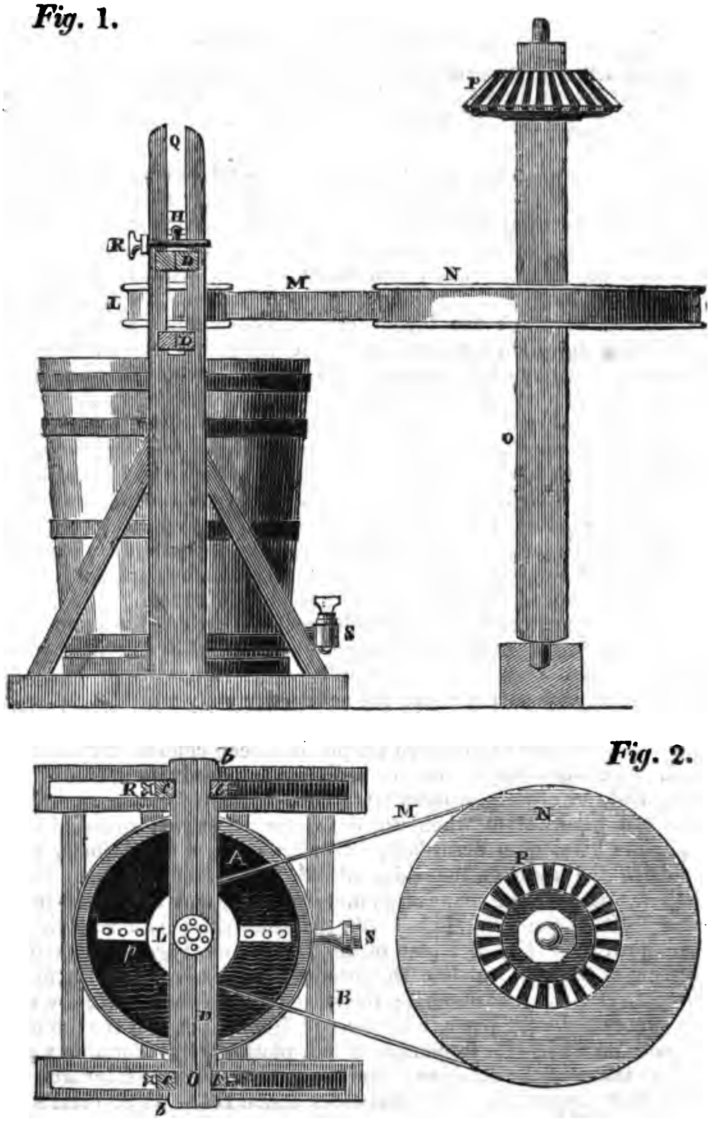


Fig. 2.

PATENT MACHINERY FOR FACILITATING THE WORKING OF MINES.

PATENT MACHINERY FOR FACILITATING THE WORKING OF MINES,

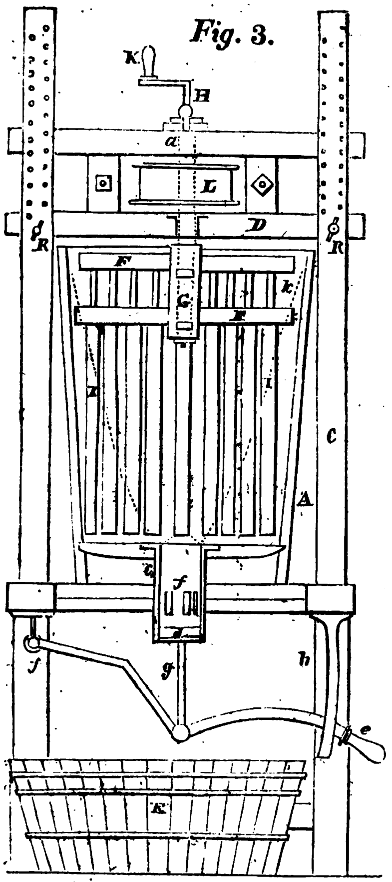
The Extraction of Diamonds, and other precious Stones; Gold, Silver, and other Metals, from the Ore, Earth, or Sand, by Mr. Charles Harsleben, of 22, New Ormond Street, Queen Square, London.—*Enrolled, June*, 1827.

Diamonds, gems, and the precious metals being scattered in minute portions over extensive surfaces of ground chiefly of alluvial soil, the process of obtaining and separating them from the matrices and earths with which they are naturally combined or mixed, is one of immense labour, when conducted by the ordinary process of washing, stamping, and picking: any improvements, therefore, in the apparatus by which the labour can be considerably abridged is of essential importance to those who are interested in such pursuits. The improvements introduced by Mr. Harsleben appear to us to be decidedly of that character; and we have the satisfaction of believing that that gentleman will derive the benefit to which the useful application of his mechanical ingenuity fairly entitles him, by the ready adoption of this new apparatus in the mining districts both at home and abroad, patents having been taken out for most countries where mining is conducted on an extensive scale. Its application is not confined to the more precious metals, but may be most advantageously employed in the separation of any other solid substances, which are of different specific gravity, and not soluble in water.

If such matrices in which metals are found are of a hard and stony nature, they must in the first instance be reduced by hammers, or by the operation of an ordinary stamping mill, to powder or dust; for the smaller the particles are the more effectually will they be separated by the subsequent process.

The materials so prepared are put in a deep conical or cylindrical tub, with a quantity of water, sufficient to permit the whole of the ore, soil, or other powdered materials, to float about in a perfectly free and liquid state whenever the water is stirred round, by the agitators hereinafter described; and with a force and velocity so as to drive the water up the sides of the tub in such manner, that a hollow space, in the shape of an inverted cone, may be formed in the water within the tub. Fig. 1 (on the other side) is a side view of the apparatus, Fig. 2 a plan of the same, and Fig. 3 (annexed) a section of the tub, to show the form of the agitator, and the means used to suspend and move it; the same letters of reference are used to denote the same parts in all the said figures. A A is the tub quite smooth on its inside, supported upon a platform B B, forming a part of the frame of the machine; and from which, the two standards C C rise, that support the horizontal cross frame D D, which carries the agitator F G H I. This agitator may be made of wood or iron, according to the magnitude of the machine, and consists of four double arms F F F F, which support and carry the stirrers I I I I, and which hang vertically. These stirrers may be screwed or morticed into the double arms F F F F, which are in like manner screwed or morticed

Fig. 3.

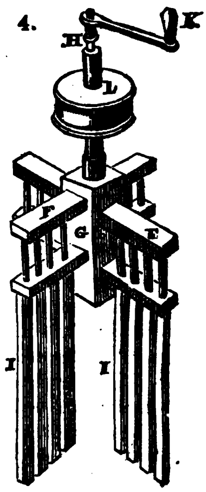


into the strong central block G: through the centre of this block (which is also the centre of the agitator) the iron spindle H passes, being fixed by a nut and screw beneath the block, and terminating at its upper end in the handle K, which serves to turn the agitator round; on which account the spindle has two turned bearings which run in brass boxes *a a*; as the power and velocity of the winch K would not be sufficient in large machines, a rigger is hung at L, upon the iron spindle H, so that the agitator may be turned by a band passing round it; and round a large rigger moved by a horse wheel, (or any sufficient power) as shown in figures 1 and 2, where M is the band, and N the large rigger fixed upon the vertical shaft O; the bevil pinion of which at P takes into the teeth of a large horse wheel, not shown in the drawings, because it does not constitute any part of the invention; by this mode of working any required number of machines can be placed round the horse wheel, and be worked at the same time. The external bars of the stirrers I I come very nearly in contact with the sides, and their extremities very near to the flat bottom of the tub, so as to insure the agitation of the whole quantity of material that may be mixed with the water, and prevent as far as possible the deposit of any part of the same, either on the bottom or on the sides of the tub; and for the due adjustment of the ends of the stirrers to the bottom of the tub, the horizontal cross frame D D is moveable up and down in long morticed grooves, made for that purpose at Q Q, near the tops of the two standards C C, (as distinctly seen in Figs. 1, 2, and 6,) and is fixed at the required height by means of the iron screw bolts R R, which pass into any of the series of holes made in the sides of the standards, Figs. 3 and 5. A temporary elevation of the agitator may at times be necessary in first setting the machine to work, if the powdered ore or sand put into the water is of such a

dense or heavy nature, as to prevent the agitator from moving; while by lifting it in the first instance, and then setting it in motion, and afterwards lowering it gently while in motion, it will gradually lay hold of the materials, and soon put them into a whirling motion.

In the annexed Fig. 4 a perspective view is given of the agitator detached from the other parts of the machine, and for the purpose of so detaching it the cross frame D D, together with its brass boxes, are made to take asunder longitudinally, as seen in Figs. 1 and 2, but are bolted together while the machine is in use.

4.



S is a cock or spigot and faucet, for drawing off the water from the tub whenever it may be necessary; in addition to this, the centre of the bottom of the tub is furnished with a peculiar valve, the use and construction of which forms one of the leading features of this invention.

This valve admits of different constructions, as will appear when its use has been described. One form of it is shown in section at Fig. 3, and another form at Fig. 5. In Fig. 3 *c c* is a brass or other metal cylinder, which must be bored on its inside like a pump barrel, in order that the piston *d*, which is packed with hemp, leather, or other fit material, may move in a water-tight manner within it; *e f* is an iron lever, turning on the fulcrum *f*, for the purpose of moving the piston with which it is connected by the rod *g*, and *h* is an iron loop or guide, which not only causes the lever *e f* to move up and down without external action, but also regulates and restrains its quantity of motion; which is necessary, because, when the end *e* of the lever is drawn up to its highest possible elevation, the piston *d* should be at the top of the barrel *c c*, with its convex upper surface just projecting into the tub, as shown by the carved dotted line; and when the end *e* of the lever is at its greatest depression, the piston must be at the bottom of the said barrel, but must never move out of it, and when the said piston is in its lowest situation, as shown in the figure, its upper surface must be just below a row of large holes which are formed round the said barrel, as at *f f*; consequently, while the piston is in its position, any fluid that may happen to be in the tub will flow out of it through these holes, into a shallow tub E, placed underneath to receive it, but if the piston is raised rather more than its own thickness, it will cover all the said holes *f f*, and prevent the discharge of any thing from the tub; although it will leave all the upper part of the barrel *c e* open as a well or receptacle to receive anything that may fall into it, and this well or receptacle may in a moment be annihilated by pushing the piston upwards.

The other form of the valve shown in Fig. 5, is similarly placed in the centre of the bottom of the tub, and for the same purpose, though rather more simple in its construction. It consists merely

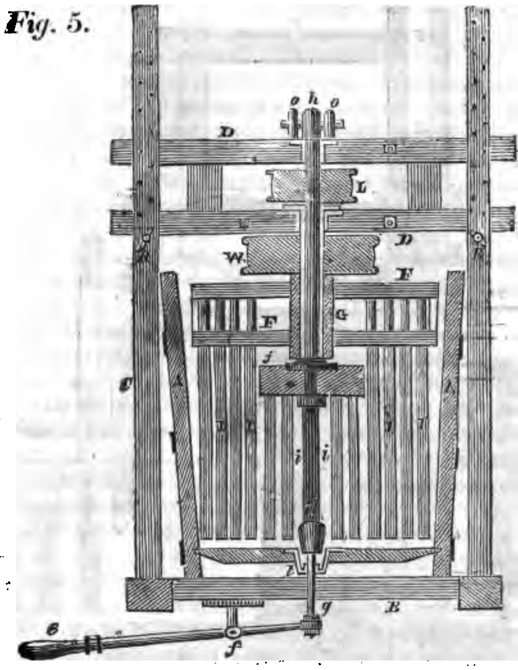
of a conical brass or other metal stopper, turned and ground, or packed so as to fit tightly into the hole of the metal plate *t t*, which is let into the bottom of the tub. This stopper is moved, as in the former valve, by the iron or metal lever *e f*, now turning on a pivot or fulcrum *f*, and attached to the plug or stopper by the iron rod *g*, so that the valve may be opened or shut at pleasure, by applying the hand to the end of the lever. It will be observed in all the above figures, and particularly in the perspective view of the agitator at Fig. 4, that there are no stirrers l l l in the centre of the agitator, but that a certain space, fully equal to the size of the central valve, is left free for them, not only for the purpose of permitting the valve to rise between the stirrers, but also to prevent the same degree of motion being given to the central part of the contents of the tub, that is given to the sides of it. Having so far described the general form and construction of the apparatus, we shall next proceed to describe the manner of using it, for the purpose of extracting the gold, silver, or other metals, or materials from the sand, earth, or other matrices, with which they may happen to be mixed.

For this purpose, the tub A A must be about half filled with water, or what is better, may communicate by a pipe, shoot, or trough, with water, which can at pleasure be permitted to run into the tub, or may be stopped, the cock S and central valve being of course closed at this time. The ore and matrice, or other material to be operated upon, reduced to a state of powder, must now be thrown in, in such quantity, that it will not exceed in weight, more than about half the weight of the water in the tub at any one time, but a greater or less quantity may be added, according to its density, which will easily be ascertained by practice. The agitator is then to be put into motion, beginning slowly at first, but quickening it until the whole quantity of water, and the materials that have been thrown into it, are put into rapid motion, and the whole of the ore, or other material, however heavy, has become completely incorporated with, and floats in, the water. It will soon be found, that the water by its centrifugal force, will rise against the sides of the tub, and leave a hollow space in the middle of it, in the form of an inverted cone, as shown by the dotted lines *k k k k*, in the section of Fig. 3. This effect takes place to such an extent, (if the height of the tub and the size of the agitator are properly proportioned to each other, and the motion is sufficiently rapid,) that the central valve at the bottom of the tub, can be distinctly seen from above, and may even be opened, without danger of discharging much of the water; and if, after continuing this rapid motion for two or three minutes, it is gradually abated, and the agitator is brought to a state of rest, it will be found, that all the gold or silver, or other metals, so mixed with the water, will be deposited in a heap in the centre of the tub, immediately over the central valve, with very little admixture of the sand or earth, that was previously mixed with it; and consequently, if the piston *d* of the tub valve in Fig. 3 is lowered, so as to form the chamber

or cavity, at the same time that the motion of the agitator is slackened, such heavy material will be deposited in the said chamber or cavity, and may be drawn off with a little of the sand, earth, and water accompanying it, into the receiving tub E, by lowering the said piston, below the holes described at *fff* in the Figure; but if the discharge should be followed by too much sand, earth, and water, it may instantly be stopped, by raising the piston above the holes. Should the ore or other material not be sufficiently heavy, to deposit itself in the centre of the tub, then the stopper valve, shown in Fig. 5, is to be used in preference, which is not to be opened, until the fluid in the tub has been moved for a minute, and the central hollow cone is formed in the middle, when the stopper may be raised, and the speed of the agitator diminished, until the water begins to flow gently from the valve, when in running it will bring the ore or other heavy materials with it, and must be permitted to run so long as this is the case; the valve is then to be closed, and the agitator again put into rapid motion, after which the valve is to be again opened, and so in succession, until the whole of the ore or other heavy material is obtained, which will be known, by its ceasing to run from the lower central valve, when the remaining refuse is to be drawn off, by opening the valve and spigot S, having previously placed another tub, called the waste tub, under the machine, for the purpose of receiving it; and while so running off, the agitator must be kept in motion to stir it up, and wash out the contents of the tub. When empty, the waste tub with its contents must be removed, and the tub A A, must be supplied with a fresh quantity of water and ore, or other heavy material, to resume the operation.

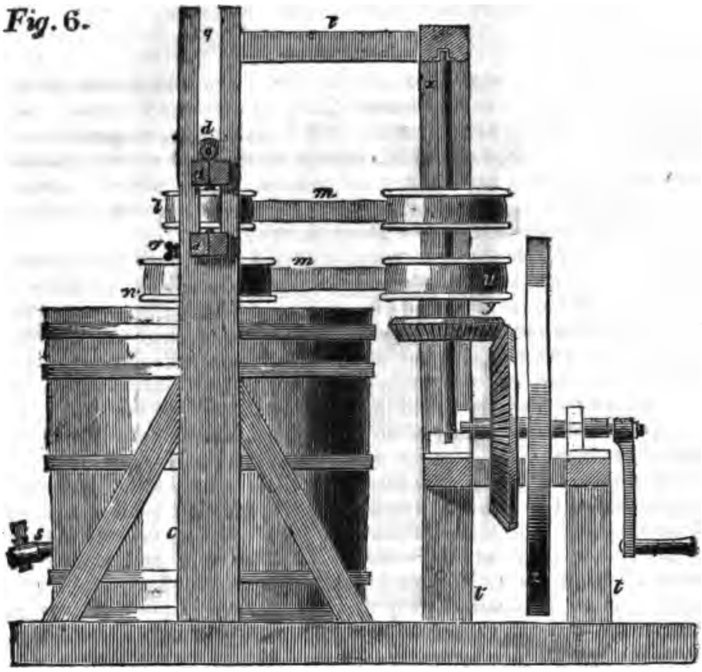
From the foregoing description of this machine in its most simple state, it will appear, that a much less proportionate quantity of motion takes place near the centre of the agitator, than near its outside, particularly when the machine is made on a large scale, on which account it is necessary, in large machines, to construct a double agitator, that is to say, one in which the central part turns or moves with greater velocity than the external part, as shown in section at Fig. 5, where I I I I F F shows the agitator constructed as before, except that its arms and stirrers are more extended from the centre, so as to make room for the smaller central agitator *iiii*, which may be constructed in the same way as before described, or may have its stirrers fixed into the circular block of wood or metal *jj*, and the iron axis, instead of being fixed into the central block G, now passes through it, and is fixed to the small or internal agitator. For this purpose, the central block G of the agitator, should be lined with a brass box, or have proper bearings upon its ends, so that it may revolve freely upon the iron spindle H; it has also a bearing at *n*, in the lower part of the cross frame D D, to assist in supporting it, and on account of the greater weight that now hangs on the said iron spindle, two friction wheels are fixed to its upper end, as at O O, which run upon the top of the brass bearing *p*, and materially diminish the friction. When the double

Fig. 5.



agitator is used, two riggers will be necessary, as at L and W, and the one at W, which communicates with the large external agitator, is made double the diameter of the smaller one L, which is fixed upon the iron axle H, in order that the small internal agitator, may move with double the velocity of the large external one. In every other respect, this machine is the same as the one already described. Fig. 6 is an elevation of a machine, with a double agitator introduced, merely to show how such a machine on a small scale, may be moved by hand. *l* and *w* are the two riggers of the internal and external agitators, as in the last Figure, and motion is communicated to them by the bands *m m*, which pass round the two riggers *v* and *u*, both of the same diameter, and both fixed upon the upright iron shaft or spindle X X, which also carries the bevil wheel *y*, which is driven by the larger wheel Y hung upon the main shaft, which also carries a heavy fly wheel Z Z, and the winch or handle by which the whole is turned. The timber framing *t t*, for carrying the said wheels and riggers, is too obvious to need description, and may be varied in form, to suit the convenience of the place in which the machinery is fixed; and when a horse wheel is adopted for machinery of magnitude, it will be almost needless to observe, that it must take into, and drive the wheel *y*, which, for this purpose, may be fixed higher on its shaft, when the wheel Y, with its fly wheel,

Fig. 6.



shaft, and handle, will be unnecessary. In the use of this machine, it is in vain to expect to get the ore, or other heavy material, separated from the sand, earth, or other materials with which it may be mixed, in a clean and perfect state, by one operation as hereinbefore described, because a considerable portion of sand, dirt, and earth, will inevitably run off with it in the water. The mode proposed by the patentee therefore is, to save all the first portions, that run off from the central valve at the first washing, in a tub or other receptacle by themselves; and when a sufficient quantity is thus accumulated, it is to be again put into a machine, which may be smaller for this purpose, and it is to be treated precisely in the same manner as the crude materials in the first instance, when it will be further cleansed and purified; but if not found in a sufficiently clean state after this second washing, it must undergo a third, or even a fourth, in the same or smaller hand machines, according to the purity required; which, by due and attentive care to the directions and instructions herein given, and a little practice, may be carried to any extent required.

[*To be concluded in our next.*]

PATENT HOLLOW MASTS,

By *Sir* ROBERT SEPPINGS, of Somerset House.—*Enrolled, March*, 1827.

It being well known to all the world that the ingenious Mr. George Smart, of the Ordnance Wharf, Westminster Bridge, was the first inventor of hollow masts, (the models of which may be seen in the museum of the London Mechanics' Institution) we have thought it proper to put the name of the above-mentioned gentleman in italic, lest it should be considered that we had inserted the wrong name to the patented invention we are about to describe.

For ships of the line, frigates, and large merchantmen, whose masts are more than 33 inches in diameter, Sir Robert proposes to form them of twelve principal pieces in the following manner. Four pieces of small square balk timber are to be united diagonally by tree-nails, so as to form a hollow square in the centre. Externally on each of these four pieces, are to be tre-nailed two additional pieces. The twelve pieces thus united are now to have their angular edges cut away and planed down, so as to bring the whole to a circular figure, when an iron hoop is to be placed around them, and the angular spaces filled up with slips of wood. In connecting the pieces of timber so as to form the required length of mast, bars of iron are to be inserted longitudinally into mortices made in both to receive them; and the several pieces of timber are to cross one another, in order to *break joint*. For constructing the masts for vessels of a smaller class than the before-mentioned, only eight or four balk timbers are to be employed, (according to the dimensions) which are to be connected longitudinally and transversely in a similar manner to that described. Hollow masts so formed, are considered to be stronger than those which are solid, while they effect a great economy in the cost, in the facility of making, and of transportation.

PATENT LAMP GLASSES,

By R. WITTY, of Hull.—*Enrolled, September*, 1825.

We do not remember to have seen any of these glasses in use, notwithstanding their advantages have been deemed sufficient to warrant the expense of a patent: the specification describes the lower half of the glass chimney to be of the ordinary cylindrical figure, and the upper half of a conical form, so that the top shall be contracted to about three-quarters of an inch less in diameter than the base. The increased light *said* to be obtained by this form of chimney over those of all other figures, the patentee considers will effect a great economy in the consumption of gas.

PATENT PORTABLE WARM BATHS.

By Mr. R. HICKS, of Conduit Street, Bond Street.—*Enrolled Sept*. 1826.

The object of the patentee was to devise a method of rapidly heating the water contained in an ordinary shaped bath. For this purpose, a broad shallow flue of metal is constructed underneath the

bath, in which is ignited a determinate quantity of the oil of turpentine, or other inflammable liquid, supplied from a reservoir above, in the side of the bath, and regulated by a stop-cock. The vapour arising from the combustion, is carried off by means of a tube into the chimney of the apartment where the bath is placed.

By a slight modification of the foregoing plan, the patentee proposes to employ the flame of condensed inflammable gas, for heating the water rapidly, in which herbs, or other medicaments, may be infused, for patients who may be labouring under cutaneous diseases. By these arrangements, a portable warm bath is prepared with great facility, in a very few minutes.

COMPARATIVE VIEW OF

FOREIGN AND BRITISH MACHINERY,

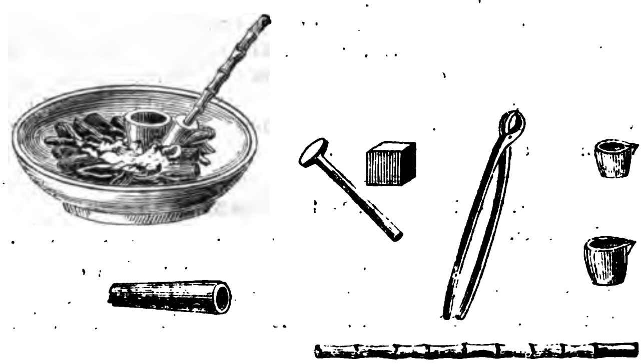
AND PROCESSES IN THE ARTS.

CEYLON. N°. X.—[Continued from page 222.]

SINGALESE GOLD AND SILVER SMITHERY.

The Singalese (Dr. Davy states) work in gold and silver with considerable dexterity and taste; and with means that appear very inadequate, execute articles of jewellery that would be admired certainly in this country, and not very easily imitated. The best artist requires only the following apparatus and tools: a low earthen-pot full of chaff or saw-dust, in which he makes a little charcoal fire: a small bamboo blowpipe, with which he excites the fire, a short earthen tube or nozle, the extremity of which is placed at the bottom of the fire, and through which the artist directs the blast of the blowpipe; two or three small crucibles made of the fine clay of ant-hills; a pair of tongs, an anvil, two or three small hammers, a file; and to conclude the list, a few small bars of iron and brass, about two inches long, differently pointed, for different kinds of work.

It is astonishing what an intense little fire, more than sufficiently strong to melt gold and silver, can be kindled in a few minutes in the way just described. *Such a simple portable forge deserves to be better known;* it is, perhaps, even deserving the attention of the scientific experimenter, and may be useful to him when he wishes to excite a



small fire, larger than can be produced by the common blow-pipe, and he has not a forge at command. The success of the little Singalese forge, I hardly need remark, depends a good deal in the bed of the fire being composed of a combustible material, and a very bad conductor of heat.

The Singalese excel rather in the setting than in the cutting of the precious stone; and particularly the Singalese of the interior, who have had little practice in the art, it having been the fashion in the court of Kandy to wear jewels uncut, or, at least, only rounded and polished.

The only metals found in Ceylon, are those of iron and manganese; the island, however, produces a considerable quantity of rare and beautiful gems, which are found distributed in the alluvial grounds. Where there is a probability of finding them, pits are sunk from three to twenty feet deep; the coarse sand and gravel through which they are generally disseminated, is collected and carried in baskets to an adjoining river, where it is well washed; the lighter particles are got rid of by a rotatory motion given to the basket in operation; and the residue, still wet, is transferred to shallow baskets for careful examination. Not only gems, the great object of the search, are collected, but every stone that has the least chance of finding a purchaser.

Our Singalese friends will read with great interest the improvements introduced by Mr. Harsleben, for the above-mentioned purposes, at page 225 of this Number.

COMPOSITION OF FORCES.

New Instruments for showing the Composition of Forces, in the production of rectilineal curvilineal Motion.

In Mr. Wallis's fifth lecture on Astronomy, delivered on the 7th and 9th November, at the London Mechanics' Institution, he introduced, for the illustration of *planetary motion*, two instruments, designed, constructed, and presented to the Institution, by Mr. Charles Holtzapffell, of Charing Cross, which we have the satisfaction of laying before the public.

Fig. I.

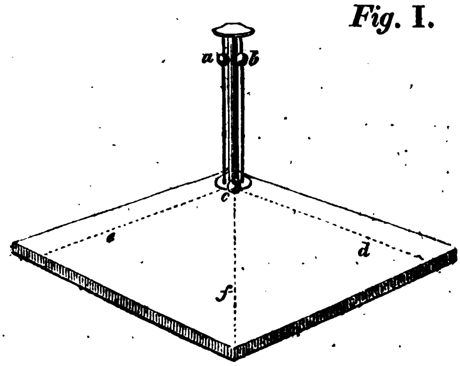


Fig. 1 represents a rectangular board, with a perpendicular brass pillar fixed in one corner. Two guide steel wires extend from the flanch at the bottom, to the cap at the top, and sufficiently distant from the pillar, to admit of the two ivory balls *a* and *b*, to descend upon them without touching the pillar. The board is made perfectly flat, varnished, and polished, and when used it must be placed level. At the point where two straight lines from the bottom of the two guide wires would meet and make a right angle, a small hollow is made, to receive a ball *c*. The weights of the balls *a* and *b*, are adjusted to correspond with the lengths of the sides of the rectangular board, so that when the ball *a* is dropped, it will give an impulse to the ball *c*, and send it to the end of the board in the direction of the line *d*, in the same time that the ball *b* would send it to the edge of the board, in the direction of the line *e*. Now, if both balls be dropped from a similar height, so as to reach the ball *c* at the same instant, it will be propelled in the direction *f*, and describe the diagonal of the rectangle, in the same time in which it would have described the lines *d* or *e*, by the force of the balls *a* or *b* singly. In this case it is evident, that the forces are such as to produce a uniformly retarding motion, which is hence rectilineal. But by the other instrument, Mr. Holtzapffell has ingeniously contrived to apply to the moving body, an accelerating and a retarding force, and thence a curvilineal motion is produced.

FIG. 2.

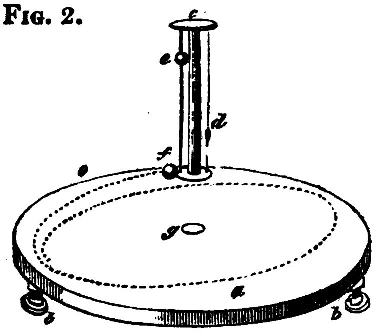
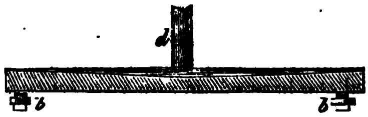


Fig. 2 represents a hollow, inverted, and very obtuse cone, about 28 inches diameter, having a depression in the centre, of half an inch.

This machine is likewise provided with a vertical pillar *c*, and a guide wire *e f*; it has also a plummet *d*, suspended with its point downwards, immediately over a pointed wire, fixed in the flanch at the bottom of the pillar, and three adjusting screw feet, two of which are seen at *b b*, for placing the cone perfectly level, which is indicated by the point of the plummet coinciding with the point in the flanch.

Fig. 3 represents a section of this instrument, showing how much the centre *g* is depressed below the circumference.



An ivory ball is placed in a small hollow at *f*, and receives an impulse, from the ball *e* being let fall down the guide wire, giving it a tendency to move in a tangent to the circumference, in the direction *f o*, but as soon as the ball *f* is liberated from the hollow, it is also acted upon, by the attraction of gravitation drawing it towards the depressed centre. *These two forces produce a motion on the ball, which beautifully illustrates the elliptical orbits of the planets.*

Soon after the ball is put in motion it approaches nearer the centre with a velocity which is accelerated by the attraction of gravitation acting somewhat in the direction of the motion, but when it passes the centre, which it does with an increased velocity, sufficient to carry it off the board at the farther side, were the motion not retarded by the attraction of gravitation acting in a direction nearly opposite to that in which the ball is moving, and thus the motion continues to be alternately accelerated and retarded, and produces the elliptical orbit in which it moves.

It will be perceived by the nature of this instrument that the tongentile force, or that which is produced by the collision of the balls, is continually diminishing, and that the centripetal force, or that which is produced by the attraction of gravitation, is continually increasing; consequently, the ball approaches nearer to the centre, and that the major axis of the elliptical orbit of the ball changes a little forward in the direction of the motion at every revolution.

If the tangentile force were not retarded by friction and the resistance of the atmosphere, the ball would describe a perfect ellipse, and continue to move in that ellipse: but as these retarding causes cannot be entirely removed, the centripetal force predominates, and the ball, after a certain number of revolutions, each diminishing in magnitude, comes to rest at the centre of the board.

It may be observed that the cone is made up of twenty-four sectors, so arranged with respect to the grain of the wood as to prevent as much as possible any alteration of form by contraction or expansion: it has been turned by machinery to ensure a perfectly conical form, and varnished to present the least possible resistance to the motion of the ball.

Natural History.

Fossil Trees. About two miles from Gallipotis, and half a mile from the Ohio river is the location of several petrified trees. They are found near the base of a mural precipice of sand-stone rock, fifty feet in height, and crowned with earth and trees to an elevation of seventy feet. From the foot of the rock, the ground gradually descends thirty or forty feet to the Ohio bottom, which is

low and swampy near the hill. The descent is probably made by the debris and earth rolling down from the hill, and gradually accumulating for ages, so as to cover a larger portion of the sand-stone rock below the surface than now appears above. The Ohio river no doubt once washed the base of this rock, but has gradually changed its channel to its present bed.

The rock in which the trees are embedded is a coarse sand-stone, and they appear in the face of the rock at different elevations, some near the present surface of the ground, and others four or five feet above. They are seven in number, and scattered through a space 80 rods in length. Some appear to have fallen, or been deposited with their tops or branches towards the river, and others in the opposite direction—some came out of the rock obliquely, and others at right angles; they vary in diameter from eight to eighteen inches; they are of a reddish brown cast, like iron ore, and so hard as to scintillate briskly when struck with a hammer or head of an axe, affording evidence of the siliceous composition. The interstices of the laminæ are, in some places, filled with small crystals of quartz; and in others with thin layers of stone coal. There is evidently considerable quantity of iron in their composition, as the surface becomes quite red after being heated in the fire. The cortical part seems to have been more difficult to petrify than the ligneous portion, as it is on most of the trees readily separated. Sand-stone is the principal rock formation throughout this part of the state of Ohio; it is of various qualities; micaceous, argillaceous, and quartzose, or siliceous; some so hard and compact as to make good mill-stones, and nearly resembling granite in colour and texture; and some so fine and close grained as to bear the chisel of the sculptor nearly as well as marble. From the position of these fossil remains, the writer is led to conclude that the trees were brought to this spot by the water, at that remote period when the valley of Ohio was an ocean, and covered in the vast bed of sand by some great convulsion of nature. The sand in time became cemented into rock, and the spaces occupied by the ligneous parts of the trees were, by infiltration, filled up with siliceous particles and iron, with some partial attempts at carbonization.—*Silliman's Journal.*

Growing small Salad at Sea.—The last Number of the Quarterly Journal of Science, contains the following directions for the cultivation of salads on ship-board.

Provide one, two, or three deal boards, made of well-seasoned inch stuff, sixteen inches square, with a ledge all round, rising one inch above the common smooth surfaces of the board; and as it is intended to hold water, the ledges must be closely and neatly fitted; at each corner a nail, or small hook, should be placed, with strings tied into a loop above, by which the board may be slung in the necessary horizontal position; a thin covering board made of the same materials and dimensions, is also necessary, which, however, will serve for all the other boards. Pieces of the thickest flannel must be provided for each board, and cut so as to fit exactly within the

ledges. These flannels require to be well soaked, and washed in boiling water, to shrink them and discharge the oily matter from the manufacturers process. The board and flannel thus prepared, dip the flannel in water, and place it on the boards; sow the seeds fully thick and regularly, sprinkle them lightly with the hand till all are moistened, and the flannel fully saturated; in which state it should be kept during the whole growth of the plants. The cover board must now be put on, and the whole hung up horizontally. The top board by preventing the evaporation, will in twenty-four hours make the seed strike root, after which it may be laid aside, and only moderate watering till six or seven days, when the salad will be fit for the table. This elegant and clever way of producing fresh salad, may be carried to any extent by a sufficient number of boards, which has only to be cleaned and dried between each vegetation, to prevent mildew.

Chemistry.

Ozmazone.—M. Peretti dissolved ozmazone obtained from beef in alcohol, and purified it by animal charcoal; the alcoholic solution then supplied him with transparent crystal, resembling oxalic acid in many properties, but differing in their action on proto-sulphate of iron. It precipitated the first a grey colour; the second of a bright yellow hue; whilst oxalic acid and the oxalates, precipitated the first yellow, and the second white.—*Bull. Univ. c.* VII. 162.

Useful Arts.

On the Uses of Steatite.—Steatite is, as is well known, a variety of the talc genus. Its colour is white, green, or grey; it is also sometimes (though rarely) red and yellow. Its specific gravity varies from 2.60 to 266. It is a compound of silica alumina, magnesia, oxide of iron, and water, which vary according to the locality. It is very common in Cornwall and Germany. As it is fusible only at an exceedingly high temperature, and is easily wrought, excellent crucibles may be made of it, which are further hardened by fire, and which are only with great difficulty penetrated by litharge. It is also employed in making moulds for casting metals. In England it is used in the manufacture of porcelain. M. Vilcot, an artist of Liege, made several trials of it, with the view of finding out whether it might not be susceptible of being employed by the lapidaries. He prepared cameos of this substance, the colour of which he brightened in the fire, and which he rendered so hard, by the elevation of the temperature, as to give sparks with steel. They were then coloured, yellow, gray, or milk-white, by different solutions. He polished them upon the stone, and ended with making them assume all the lustre of agate. Some pieces even resembled onyx, in colour; but a serious inconvenience was, that the markings were easily altered by the fire, and could no longer be restored. Steatite has a great affinity for glass; it is also employed, in the manner of paste, reduced to a fine powder, and mixed with colouring matters, for painting upon this substance.

It also serves as a sympathetic crayon for writing upon glass; the

traces seemed effaced, when a piece of woollen is passed over them, but they re-appear immediately, when moistened by the breath, and again disappear when the glass becomes dry. Steatite is not so easily effaced as chalk, and does not, like that substance, change its colours. Tailors and embroiderers also, prefer it to chalk, for marking silk. It possesses the property of uniting with oils and fat bodies, and enters into the composition of the greater number of balls which are employed for cleaning silks and woollen cloths; it also forms the basis of some preparations of paint. It is employed also for giving lustre to marble, serpentine and gypseous stones. Mixed with oil, it is used to polish mirrors of metal and crystal. When leather, recently prepared, is sprinkled with steatite, to give it colour, and afterwards, when the whole is dry, it is rubbed several times with a piece of horn, the leather assumes a very beautiful polish. Steatite is also used in the preparation of glazed paper; it is reduced to a very fine powder, and spread out upon the paper; or, it is better to mix it previously, with the colouring matter. The glaze is then given to the paper with a hard brush. It facilitates the action of screws, and from its unctuosity, may be employed with much advantage, for diminishing the friction of the parts of machines which are made of metal. [*Edinburgh Journal.*

LIST OF PATENTS

That expire in the present month of November, 1827.

SPINNING.—To J. C. Dyer, of Camden Town, for a method of spinning various fibrous substances. Dated 1st November, 1813.

SOFAS.—To S. James, Hoddesdon, for an invalid sofa or couch. Dated November 1, 1813.

STEAM ENGINES.—To John Barton, of Tufton Street, Westminster, for various improvements in the construction and application of steam engines. Dated Nov. 1. 1813.

PRINTING.—To J. Ruthven, of Edinburgh, for a printing press. Dated November 1, 1813.

BREAD.—To Thomas Rogers, of Bagot Street, Dublin, for a new preparation of flour, for bread, pastry, &c. Dated November 1, 1813.

RAISING WATER.—To William Summers, Jun. of New Bond Street, for a method of raising hot water from a lower to a higher level, &c. Dated November 1, 1813.

BUTTONS.—To Benjamin Sanders, Sen. of Grandby Place, Surrey, for improvements in manufacturing buttons. Dated November 4, 1813.

CARRIAGES.—To Charles Wilks, of Ballincollig, Cork, for various improvements in the construction of carriages. Dated November 9, 1813.

NAUTICAL INSTRUMENT.—To William Pope, of Bristol, for an instrument to ascertain a ship's way at sea. Dated November 16, 1813.

FIRE PLACES.—To William Bange, of Bristol, for improvements in the construction of fire places. Dated November 16, 1813.

ROPE MAKING.—To James Brunsall, of Plymouth, for improvements in rope making. Dated November 16, 1813.

REFINING SUGAR.—To E. C. Howard, of Westbourne Green, Middlesex, for improvements in refining sugars. Dated November 20, 1813.

FIELD EQUIPAGE.—To Frederick Cherry, of Croydon, for improvements in an officer's field equipage. Dated November 23, 1813.

SOAP.—To Jeremiah Donovan, of Craven Street, Strand, and J. Church, of Chelsea, for saponaceous compounds for washing in sea water, &c. Dated November 23, 1813.

PRINTING.—To R. M. Bacon, and B. Donkin, of Bermondsey, for improved apparatus for printing. Dated November 23, 1813.

FIRE ARMS.—To James Bodmer, of Stoke Newington, for a method of loading fire arms at the breach, also an improved touch hole and sight. Dated November 23, 1813.

STAMPING.—To Edward Biggs, of Birmingham, for a method of working stamps by a steam engine, &c. Dated November 23, 1813.

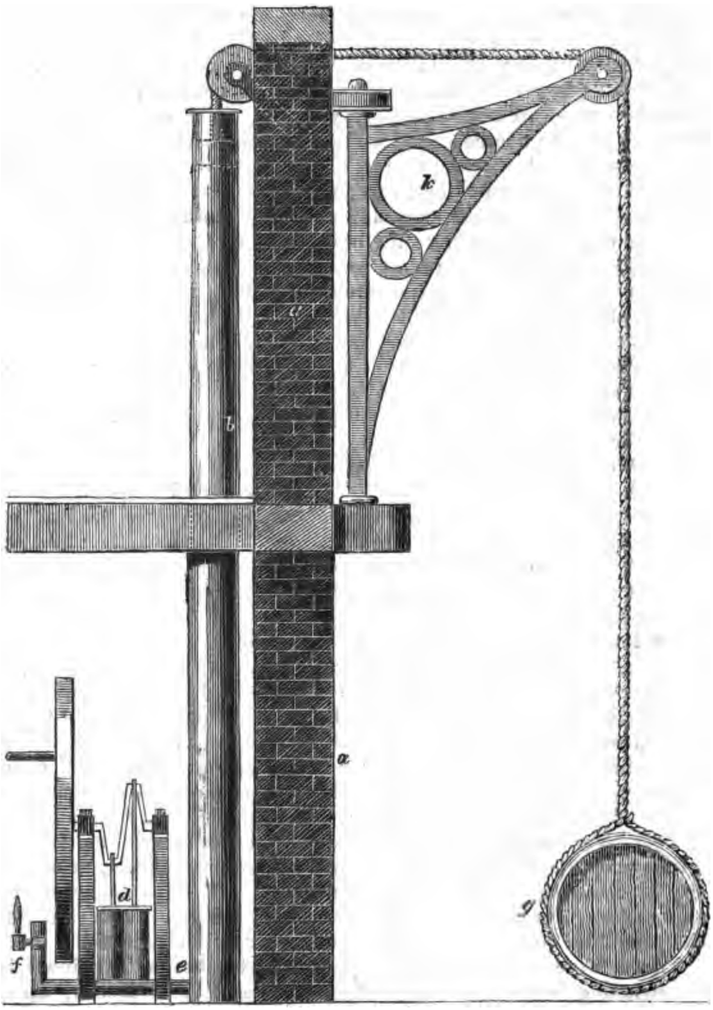
OPTICAL INSTRUMENTS.—To John Duncombe, of Woolwich, for improved nautical and other instruments. Dated November 25, 1813.

BUILDING.—To John Cragg, of Liverpool, for various improvements in ornamental building, water pipes, lightning conductors, &c. Dated November 29. 1813.

DYEING.—To Maurice de Jough, of Kentish Town, Middlesex, for methods of preparing madder. Dated November 29, 1813.

STOVES.—To Isaac Wilson, of Bath, for improvements in stove grates. Dated November 29, 1813.

A. B.—J. M.—and Mr. Lee's Favors in our next.



SELF ADJUSTING CRANE.

SIR,—

I HAVE now the pleasure to forward to you my plan for a self-adjusting crane, which I promised you some time since; but which a long and severe illness prevented me from forwarding earlier. I had long been endeavouring to contrive a crane, capable of raising varying loads without waste of power or loss of time, and the plan I now propose, would, I think, be found to answer in certain situations.

It was suggested by a passage in Robison's Mec. Philos. 7, stating, that whilst in the single barrelled air pump the force required to raise the piston, became greater as the rarefraction proceeded; in the double barrelled air pump on the contrary, less power was requisite, to raise the pistons, as the air in the receiver became rarefied; and that when the rarefaction was very great, little more force was necessary than to overcome the friction of the machine. Now suppose a piston at the bottom of a cylinder, and the air to be rarefied above the piston, it will begin to rise as soon as the pressure of the atmosphere on the piston exceeds the weight of the piston; and as the force requisite to produce the first stroke of the double barrelled air pump, is sufficient to produce any degree of rarefaction, and consequently any degree of pressure on the piston, not exceeding the gravity of the atmosphere, it follows that the same power applied to the pump, will raise any weight within the limits of the machine, but in a longer space of time, as a greater degree of rarefaction is required above the piston.

One modification which I would propose is as follows:

a, the side of a warehouse.

b, A cylinder attached to the same.

c, A piston fitting air-tight in the cylinder, and suspended by a rope or chain passing over the crane *h*, and attached to the load *g*, by the other end.

d, A double barrelled air pump, worked by a winch and fly wheel.

e, A pipe connecting the air pump with the cylinder, and terminated by a stop-cock *f*.

The action is as follows:—The piston being at the top of the cylinder, and the pumps set at work, the air will become rarefied, until the excess of the pressure of the atmosphere, above the pressure of the air in the cylinder, shall be greater than the weight to be raised, when the piston will begin to descend, and will continue descending as fast as the exhaustion is carried on. To lower, open the stop-cock, which will admit the atmosphere. A cylinder and piston of fifteen inches diameter, would raise any load from a barrel of flour to a hogshead of sugar, by a continued and equal motion, in a time proportioned to a load, and without toothed wheels, or necessity for changing the power of the machine. Should this meet your approbation, I propose sending you shortly a different modification of the principle, to a machine not requiring a continuous motion.

As I have seen in the Morning Chronicle that an Engineer is constructing some cranes for the St. Catharine's Docks, upon pneumatic principles, I should not have troubled you with this had not I mentioned the subject to you long before the notice appeared in the above-mentioned paper.

I am, Sir, your most obedient,

Nov. 27, 1827. J. M.

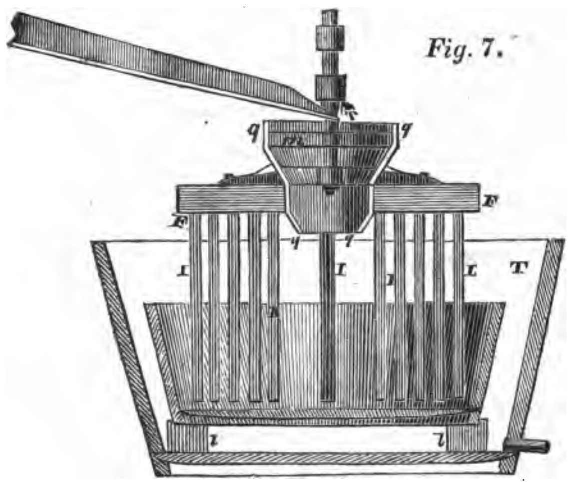
PATENT MACHINERY FOR FACILITATING THE WORKING OF MINES,

The Extraction of Diamonds, and other precious Stones; Gold, Silver, and other Metals, from the Ore, Earth, or Sand, by Mr. CHARLES HARSLEBEN, of 22, New Ormond Street, Queen Square, London.—*Enrolled, June*, 1827.

[Continued from p. 232.]

It is also necessary to observe that the operation of washing and separating ores, or other heavy materials, by the machinery before described, may be effected (though in a less convenient manner) without the adoption of either of the bottom central valves, or any valves at all; because such heavy materials, if not permitted to escape by the valves, will accumulate in a heap in the centre of the tub—and will be there found upon carefully removing the sand, earth, or matrice from around about it; or another process may be used, such as the apparatus delineated in the annexed fig. 7 is adapted for.

Fig. 7.



In this case a shallow tub is set within a deeper and larger one, T, either with or without the blocks or legs *l l* to raise it above the bottom of the exterior tub; or the inner tub may be fixed in a running stream, or a stream may be made to run continually into and out of it. When the apparatus is arranged in this form, the revolving motion of the agitator F F I I will have the effect of throwing most of the water that is introduced with the ore into the shallow tub, over its edges into the external tub, or into the running stream (as the case may be), or into a reservoir; and with it nearly all sand, earth, or matrice will also be thrown over, so as to leave the ore, or other

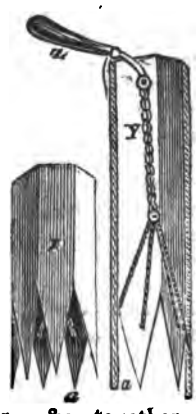
heavy material, in a nearly clean state at the bottom of the tub, particularly, if a sufficient quantity of water has been used during the process.

The whole agitator is now to be removed, for taking out the clean ore, and when an accumulation of refuse has taken place in the outer tub (if such a one is used), the inner one is to be removed, and the agitator lowered into the other large tub for stirring up the said refuse and water, while it is drawn off by the plug or spigot and faucet as S; after which, such refuse and water are to be again passed through a machine by way of examination, to ascertain if any ore, &c. had passed over with it; and if so, it will be obtained at this second washing. The refuse and water might be led over coarse flannel or cloth, in which the heavy material would deposit itself, if there be any left in the refuse. It may likewise happen in some cases, that the ore, or other heavy substances, cannot conveniently be broken down and reduced to powder, but may contain diamonds, precious stones, lumps, or fragments, which would be too large and heavy to be put into motion with the water as above described: whenever this is the case, the construction of the agitator shewn in fig. 7 is recommended, which in effect is the same as those already described; but instead of intersecting the arms F F, which carry the stirrers I I I I into the central block of wood already described, a circular kind of funnel or hopper is constructed, as shewn in section at *g g g g*, of iron, and the spindle revolves into transverse pieces *m m* within the said hopper; such pieces being placed with their thinnest dimensions upwards, so as to cause as little obstruction as possible: this hopper is to be fed with ore previously broken as small as convenient, by means of the shoot *n n*, which may be shook by joggles at *r* like a corn-mill, or be fed by any other convenient method. Fig. 7 also shews another form of agitator: a double set of arms to carry the stirrers is not essential; all that is necessary is, that it should possess sufficient strength and substance to put the whole of the water, and heavy materials that may be mixed therewith, into a sufficiently rapid motion, to produce the conical hollow space similar to *k k k k*, fig. 3, as before described.

In addition to the several modes of working the apparatus described, it is proposed to work the same on streams or ponds where gold-dust, ores, &c. may be found, or suspected to exist, without using a tub, in which case the agitator only is to be used, and must be supported, as before, by its cross bearers D D and standards *c c*. Figs, 1, 2, 3, 5, and 6, being either fixed to the bottom of a boat or punt, or supported between two boats or punts, the same being immoveably moored or fixed upon the water; or the machinery may be placed upon a stage with legs, adjustable to the depth of the water, so that the agitator may be put into rapid circular motion as before described; or as near as possible to the bottom of such river or stream, when it will soon, by such motion, remove the soil (provided it is not too hard and stony), and will form itself into a circular hollow space equal to its own diameter, into which space it is to be gradually

lowered as the earth is washed away, when, if any gold-dust, ore, or heavy metals are present, they will be brought to the centre thereof as effectually as if the first agitator had been worked in a tub; which done, the position of the central spindle of the agitator is to be worked as accurately as possible, either upon the stage which supports it, or by placing upright straight rods in the ground round about it, when a light metal tube of tin or plate-iron, open at both ends, and of a diameter equal to about one-fourth of the agitator that has been used, is to be lowered over the said central spot, for the purpose of covering and confining whatever may have been so brought to the centre; which may then be raised in the tube, by inserting a pump therein, till it reaches the sand, and, after having made with it a partial vacuum by raising this pump, the whole tube is brought out with it; or by means of proper ladles, augurs, screw-worms, or other implements used for boring the earth, and bringing up the same through tubes, for well-sinking, and other well-known purposes; or the implement shewn at fig. 8 may be used to advantage. It consists of an hexagonal or other polygonal pipe of iron, made nearly to fit and fill up the inside of the light pipe before-mentioned (directed to be lowered for covering and securing the materials); its lower end is to be formed into as many points as the 1st polygonal has sides, as at *a a a a* and fig. 8: these points should be of steel, not only for durability, but that they may bend inwards and spring open again in the form shewn at X, in which state the pipe is to be lowered into the tube above-mentioned, and it must be pushed through the soil, or whatever the agitator may have brought to the centre, by slackening and turning it round; while at the same time, the central chain, which communicates by branch chains with each of the first points as seen at Y, is to be strained with sufficient force, either by the lever Z, or in any other way, to bring all the first points *a a a*, &c. together, in which state they will be retained, until the contents thus confined to the pipe are brought up out of the water, and discharged on the boat or platform.

Fig. 8.



Another object in this patent consists in a certain means of transferring or removing the force or power of a water-wheel, steam-engine, or any other prime mover of machinery, from the situation in which the same may happen to be placed, to any distant situation where such power may be required for use, without the expense and loss af time attendant upon the removal of such prime mover, which, in many cases, such as a natural fall of water, will not admit of being moved. This removal or transfer of power from one place or situation to another, is of great importance in many mining operations, as in pumping distant shafts, or ventilating the same, or in performing

the like or other operations, in several distant shafts at one and the same time. The way in which the patentee proposes to effect this purpose is as follows: he attaches one or more truly-bored cylinders of metal, having pistons within them in the nature of pumps, in such manner that they be effectively worked by the prime mover, whether it be a power obtained from wind, water, steam, animal labour, or in any other way, such pistons being so attached by cranks, levers, beams, or any of the usual and accustomed means. The pistons so attached have no valves, but are made to work in a completely air and water-tight manner within the said cylinders, which must vary in number or magnitude according to the amount and velocity of the power to be transferred. If the power is to be transferred in the simplest form of which the invention is susceptible, it is effected by placing a certain water-tight metal pipe or tube to the bottom of the cylinder or cylinders so connected with the prime mover as aforesaid, and having laid or conducted such pipe to the other situation to which the power is to be transferred, so as to terminate in the bottom of another cylinder, with a piston similar to the one at the other end of the pipe. This done, the centre length of the pipe is to be completely filled, and the cylinders half filled, with water, or any other incompressible fluid, and the pistons being put in their proper situations upon the water, the machine will be ready for action. In order to let the pistons come into actual contact with the water in the cylinders, each piston must have a small hole in it for the escape of the air when fixing the apparatus, which holes are afterwards to be closed by air-tight screws; and in this modification of the apparatus, both the cylinders may have open tops, because the atmospheric pressure will be equal in both of them; and whenever the piston of the cylinder nearest to the prime mover is depressed, it will press upon the incompressible water below it, and by driving it into the close pipe, will fill the cylinder or cylinders at the extremity, and thereby elevate its piston, which is again depressed as the other is elevated, and so on alternately, the power is transferred from one to the other.

An apparatus thus constructed may be used for transferring motive power to short distances; but where the distance is great, and it is necessary to convey the power as completely as possible, two separate pipes are used instead of one; the cylinders are to have close tops instead of open ones, and their piston-rods should work through stuffing-boxes. The one pipe serving to connect the two lower parts of the cylinder together, and, by means of the other pipe, the upper parts of the cylinders are to be united, which, together with the said second pipe, are to be filled with water. The consequence of this arrangement will be, that while the first, or power cylinder, is forcing water by the descent of its piston into the lower part of the distant or extreme cylinder, it will likewise be drawing off the water above the piston in the last-mentioned cylinder by the same motion; and it will not only thus remove all resistance to motion in the distant piston, but will promote it by the vacuum made

on one side of the piston always taking place at the very moment when the force is accumulating to operate against the other side of it. When transferring the power by the above-described apparatus to considerable distances, a strong but small air vessel is to be connected to each end of the pipe of communication; or to each end of each pipe, when two pipes of communication are used, such air vessels are to be placed as near to the said cylinders as convenient, in order that the motion of the piston or pistons may not be too suddenly communicated to the confined water, which will make its way into such air vessel when pressed upon; thereby condensing the air before it, which re-acts by its elasticity, and produces a more equable action than could be otherwise obtained.

In the construction and use of this apparatus, the pipe or pipes of communication between the cylinders need not be kept truly level, although it will be more advantageous to the working of the machine if this can be effected. The pipes of communication must likewise be of cast iron, or other suitable material, that is quite air and water-tight throughout its length, and strong enough to resist the force or pressure of the power that is to be transferred; and the said pipes should also be of sufficient bore or capacity to allow of the free and uninterrupted motion, and passage of the water within them, without friction or impediment; as upon this circumstance, and the whole of the apparatus being perfectly air and water-tight, its equable and certain action, in a great measure, depend.

PATENT AIR-TIGHT STOPPERS,

For Inkstands, Jugs, Jars, &c.

By Horsley & Cooper, of Gracechurch Street.

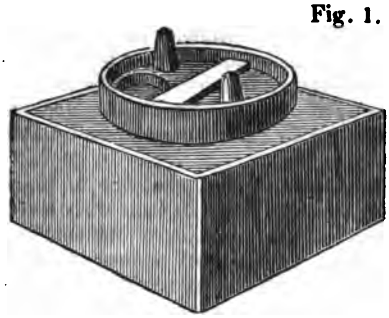
A variety of vessels to which the above invention had been applied was exhibited by Dr. Birkbeck in his lecture delivered on the 28th ult., at the London Mechanics' Institution, on the ancient and modern methods of preserving animal substances, from some of which we made the following sketches for our readers, as explanatory of their construction and utility.

These air-tight stoppers are formed by the contact of two circular discs of glass or porcelain; the flat surfaces of which being ground to true planes, are opposed to each other, and united by a central pivot, that is rivetted to a bar of metal fixed above them across the mouth of the vessel. Each plate has a sufficiently large aperture, for the convenient taking out, or putting in of the matters they are intended to contain; and the upper plate is provided with two projecting studs of glass or porcelain cast to them, at equal distances from the central pivot. The thumb and fore-finger being applied to these studs, the upper disc is easily moved round either to the right or to the left; one way brings the apertures opposite to each other,

and opens the vessel, the other way slides the unperforated part of the upper disc over the aperture of the lower, and perfectly closes it.

To render the motion perfectly smooth and easy, it is in some cases desirable (as in inkstands) to slightly oil the surfaces in contact, which is easily done at any time.

Fig. 1.



The annexed cut, Fig. 1, exhibits a perspective view of an inkstand of very thick cut glass; the discs or stoppers of which are surrounded by a metallic ring, and kept down in their place by an horizontal metallic bar, into which the pivot of the discs is fitted. In this figure it will be perceived that the inkstand is closely *shut*, the aperture in the upper plate being over the unperforated part of the lower. On turning the studs a quarter round, they are stopped by striking against the cross bar, when the two holes are exactly opposite to each other; and on turning the studs the reverse way, the apertures are perfectly closed again.

Fig. 2.

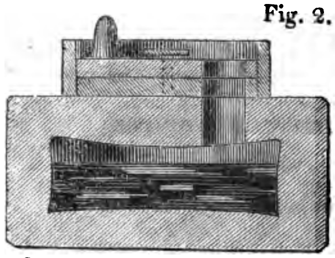
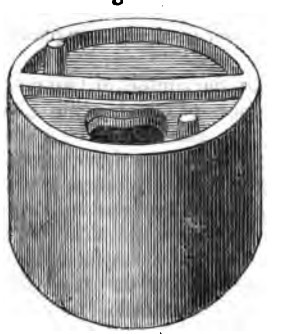


Fig. 2 shews a section of Fig. 1, bringing into view the great thickness of the glass bottle; the perforation in which coinciding with the apertures of the two discs, the inkstand *is open*; underneath the bar (the end of which is brought into view by a transverse section) there is a steel spring—which keeps the discs in close contact.

Fig. 3.

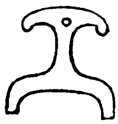


The annexed figure 3 represents an earthen or porcelain jar, for preserves or pickles: the holes are herein shewn as coinciding, consequently the vessel is open; on turning the studs by the two hands, (the vessel being supposed to be large), the upper porcelain plate slides round over the lower, and closes it; the cross bar in this case is of porcelain, in one piece with the sides of the vessel; a pivot, on which the circular discs turn, is fixed into this bar, and under which is a steel spring for pressing the discs together.

Fig. 4.

Fig. 4 represents an earthen jug, to which another modification of the patent stoppers is applied. A portion of the jug is shewn as broken away, to bring into view the essential parts. In the present position of the upperplate the jug is closed. To open it, the ends of the metal key, fig. 5, are introduced into two small apertures, shewn in the upper plate, by which it is turned round (instead of the studs in the previously described utensils); the large aperture is thus brought round to the spout of the jug, under which the other aperture in the lower plate is situated. This jug is intended for the conveyance and preservation of any kind of liquid, but chiefly those of the fermented kinds, such as beer, ale, cyder, &c., the agreeable qualities of which are destroyed by exposure to the air; and the key is used in lieu of the studs (employed in the other vessels) as a security against any depredation being committed upon the contents of the jug. The close stopper likewise prevents any of the liquid being lost by accidental or careless spilling.

Fig. 5.



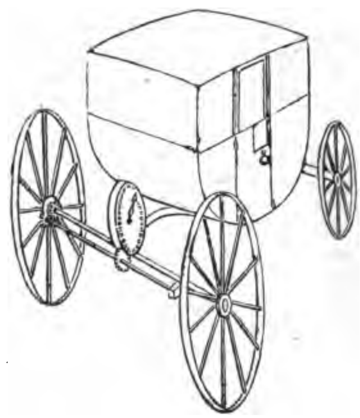
The most striking advantage these patent stoppers possess is, the great facility and expedition with which a vessel may be opened and perfectly closed; and the extreme simplicity of their construction prevents the liability of derangement; joined to which may be added, the incorruptibility of the materials of which they are composed.

To the Editor.

Sir,—As your's is a work peculiarly set apart for the recording useful inventions, I beg to submit an idea of mine to the public, through the medium of your highly valuable publication.

I have for some time past been thinking of a plan to protect the public against the impositions daily and hourly practiced by the drivers of hackney coaches and chariots, in regard to fares by distance, and have suggested one to the commissioners, that, in my opinion, is perfectly easy in execution and completely effective.

My idea is to attach to the rails of the hired carriage of all the coaches and chariots, a machine similar in appearance to the diagram below; to be worked by a cog pinion on the nave of one of the wheels, having a dial face on both sides, indicating by a hand miles and half-miles, upon the old principle of a perambulator, and as all the wheels are not exactly of the same height, the space or segment of the circle which the hand passes over in describing a mile, must be marked off accordingly, and adjusted to the diameter of the wheel. A person hiring a coach would only have to cast his eye through



the spokes of the hind wheel, and observing the exact situation of the hand, would at the end of his ride know *exactly* the distance he had gone by again looking at the INDICATOR. An objection has arisen, that this plan would put the hackney coach owners to a great expence, which, they are many of them quite unable to meet, to obviate which, I propose the public should pay a small increase of fares for a couple of months to defray this expence, and they would thus pay for their own protection. The expence of the proposed machine, with fixing, &c. &c. could not exceed 5*l*, per coach, and I should think might be done for much less; but even that sum is perfectly inconsiderable, when put in competition with not only the impositions which are constantly practised, but the endless quarrels and disputes which arise from 'fares by distance.'

There are 1,200 coaches and chariots earning on an average 15*s*. per day, or 328,500*l*. per annum; now, if only half the sum consists of 'distance fares,' it would be 164,260*l*.; now all who ride in hackney coaches, and know the fares, are aware of the constant demand for much more than the sums allowed by act of parliament, and also know they often submit to the imposition rather than be at the trouble of either measuring the ground or summoning the driver; but when we take into consideration the number of people who ride, and do *not know the fares*—the ladies, sailors, country people, &c. &c. we may fairly calculate that one-fourth is paid more than should be, for fares by distance, which fourth amounts to 40,950*l*. annual imposition upon the public, which might be perfectly guarded against by the adoption of my *indicator*, and at an expence of only 6,000*l*. at the very highest calculation of 5*l*. per indicator for the 1,200 coaches.

We must also recollect, that the *owners* of coaches do not get any advantage by the over paid fares, these go into the pockets and down the throats of the drivers, whose constantly drunken state cannot be supported by the wages they receive; a public-house is to be ob-

served in the immediate vicinity of every coach stand, from which the waterman has most frequently to fetch the coachman ere the drive is commenced, This plan would also act as mutual protection to the driver as well as the rider, as the commissioners state they have as many complaints one way as the other; *it may be true*, the number of complaints are nearly equal, but do the commissioners recollect that where a coachman is under paid, he is so well acquainted with the distance, and as his expences are paid if he be right, he is quite sure to summons the rider; thus every case on this side makes its appearance, which not one in fifty of the other ever is heard of.

The commissioners have rejected this plan, but can or will give no *reasons* why; they merely state, "it is not practicable." I on the other hand *state* "it is practicable," and am ready to prove it by actual experiment, at my own expense, if they on finding it answer, would patronize it; but even this they decline, and the public must still be content to be imposed upon, having the power and privilege of applying to Essex-street for redress, when half the fines levied will go in some way or other to that office.

I am sorry to send you so badly a drawn diagram, but if you can from it catch the idea, your experience will quickly put it into drawing and perspective, if you think the whole matter worthy your notice.

90, Shad-Thames, I am, sir, your obedient servant,
15 Nov. 1827. J. W. Lee.

WRIGHT'S CRANE.

Of our three perpetual motion assailants, one of them, the *Technological Repository* has discreetly submitted. The *Mechanics' Magazine* and the *London Journal* still hold out. The latter work, from its "absurd extravaganzas," is calculated to do no harm: we shall, therefore, only reply to the former; and, as we are accused in it of mis-stating, we shall give the whole article verbatim, with our answers to it in an opposite column.

Observations of the "Mechanics' Magazine."

1. The Editors of a contemporary journal (the *Register of Arts*) have thought proper to apply to themselves the appellation of "dogmatizers in science," used by us in our 220th Number, when speaking of those who, in spite of ascertained facts, persist in denying the merits of Mr. Wright's new crane.

2. And, to prove how much they are entitled, by their habitual modesty and discretion, to a more enviable sort of distinction, they pronounce what we have said of Mr. Wright's crane to be "a tissue of absurdities," at variance with "the first principles of physical science," and founded on facts either not wit-

Reply of the "Register of Arts."

1. As the *Register of Arts* was the only journal that had given an unfavourable opinion of Mr. Wright's crane, the application could not be mistaken. We never denied "the *merits*" of the new crane; but we said, and do persist in maintaining, that its merits are greatly inferior to those of the common crane, which, by "ascertained facts," was fully demonstrated at the trial.

2. To occupy our columns in proving that to be absurd which, having been a thousand times demonstrated, is universally admitted to be so, would, we are sure, be displeasing to *our* readers; and we are by no means disposed to curry favour with *the per-*

nessed by us, or by us alone; and this, without either establishing a single absurdity against us, or even attempting to convict us of a single misstatement.

3. We asserted that "*both power and velocity are gained by the new combination;*" and to prove this absurd, the Editors of the *Register* ask us if we mean to "dissent from the proposition, that *no power can be gained by machinery but at the expense of velocity?*"

4. Our readers will perceive at once the utter dissimilarity between the two cases. In the former, one combination of mechanical powers is spoken of, as contrasted with other combinations—the new crane with the old cranes: in the latter, the "machinery" that loses velocity as it gains power, is but one sort of machinery, differently applied.

5. Suppose we had asserted that a man could exert greater force with a screw-driver than with a stock-bit, would these sapient Editors have thought to cover us with confusion, by asking—Do you mean, then, seriously to assert, that a man of sixteen stone weight can ride faster on a horse than on a donkey?

6. We are next charged with "either describing what we did not see, or seeing what others did not," on the occasion of the trial of Mr. Wright's crane. But of this serious insinuation no proof whatever is offered. We defy them to produce any.

7. The "most remarkable part" of our statement is said to be, "that a man, by turning a roller with a handle, can do only half the work which he can accomplish when assisted by the wheels and pinions of the common crane." And how do they disprove this? By asserting it to be a well-known fact, "that a man, with a simple roller and handle, can raise a *greater* weight in a given time, than with all the additional assistance afforded by the wheel and pinions of the common crane."

8. "A *greater* weight IN A GIVEN TIME!" Mark here, again, reader, the honesty and ingenuousness of these editors! Our statement, as must have been evident to every one who read it, referred to work done *for a daily continuance*: they refute it, by showing what can be done in *a perpetual motion students* of the *Mechanics' Magazine*.

3. It is perfectly consistent in the Editor of the *Mechanics' Magazine* to make such an assertion, as it has been a hundred times repeated before in the same work.

4. This is a poor attempt to draw a distinction between two cases, when there is, in point of fact, none whatever. The writer, it will be perceived, endeavours to explain, by saying *that he meant to say*—namely, that "*both power and velocity are gained by the new combination*" of Mr. Wright's crane, over the old combination of the common crane. Now, the movement of the common crane is effected by a pinion or small wheel; the pinion is a *continuous* series of levers, turning on one uniform central fulcrum. The movement of Mr. Wright's crane is effected by distinct levers and wedges, having an *intermitting* action, with all their attendant weight and friction; and it is this curious contrivance which is to "gain power and speed" over the lever in its most convenient and effective form—namely, that of a pinion! Mark this, ye students of perpetual motion, and go to work!

5. The first part of this paragraph is absurd in mechanics; the second very unbecoming an editor.

6. If the Editor was present, he must have been hid in a sugar hogshead; for he was certainly not visible to us, nor to any of the visitors present. If he brings forward a cooper to prove that fact, it will avail him but little, because he could not see *both* cranes through the eye-hole of the hogshead, as the "old" crane was in a distinct warehouse to that wherein the new one was at work. Now, as the writer speaks of "*all the wheels*" of the common crane, which had in fact but *one* wheel, it is clear he *was not present* at the old crane warehouse, but must have been cooped up in the new warehouse, alongside his darling perpetual motion.

7. It seems that the Editor, far from denying his statement about "the roller and handle," manfully maintains its correctness, like a true perpetual motion defender. Let him but add wheels and pinions until the machinery can not be moved at all without any load, and he will then,

Attack.

given time—in five minutes, for example, or an hour!

9. If their objection were good for any thing, it would go to this extent—that cranes are good for nothing!!

10. It is said afterwards, in more specific terms than any yet quoted, that we have asserted "that both *power* and *speed* may be gained by *increasing* the parts of a machine." A wicked misrepresentation! We never made any such assertion, nor said any thing which can bear such a construction.

11. From the *manner* of this attack (parts of which are even more *unmannerly* than any we have quoted), it is hard to believe that a desire for *truth* can have formed any part of the object aimed at by its authors. What then? Can they have any sinister purposes to gratify? Does our success as journalists offend them, that they seek, by false accusations, to depreciate us in public opinion? Or, can it make any difference in their estimate of the labours of the Editor of the *Mechanics' Magazine*, that one of them happens to be a leading member of that body, whose conduct in the management of the London Mechanics' Institution it has so often fallen to the lot of this work to censure and expose? We leave it to the candid and impartial to judge.

Reply.

perhaps, find out what "*additional assistance is afforded.*"

8. If the Editor does not know the meaning of the terms, "*in a given time*," let him ask any individual in the least acquainted with mechanical science; but, to oblige him, we will undertake to prove that a man can, "*for a daily continuance*," do more work (raise more sacks of corn, for instance,) with a simple "roller and handle," than with "all the additional assistance afforded by the wheels and pinions of the common crane."

9. No such thing! The use and advantages of cranes, for accumulating the power of a first mover, when applied to masses upon which such power would be ineffective without accumulation, has been clearly stated by us, in our description of Mr. Wright's crane, contained in our 11th Number.

10. The assertion is repeated in the 7th paragraph above.

11. The attack proceeded from the perpetual motion Editor, who called us "*dogmatizers in science*," for writing a little plain truth about the matter: what was the sinister motive that induced him to be so "unmannerly?" The remainder of this paragraph is unintelligible to us, as it has no application to any facts that we are acquainted with.

LITERARY AND SCIENTIFIC INSTITUTIONS.

Royal Society.—On Friday the 30th November, the election of officers for the year ensuing took place, when the following gentlemen were chosen:—

Davies Gilbert, Esq., *President.*

Capt. H. Kater, *Treasurer.*

Dr. Roget, Capt. Sabine, *Secretaries.*

Davies Gilbert, Esq., Pres.; Capt. Beaufoy, R. N.; J. G. Children, Esq.; Sir H. Davy, Bart.; J. F. W. Herschel, Esq.; Sir E. Home, Bart., V. P.; Capt. H. Kater, V. P.; John Pond, Esq., A. R.; William Prout, M. D.; W. H. Woolaston, M. D., V. P.; Thos. Young, M. D., Sec. Foreign Corres.; Francis Baily, Esq.; Rev. W. Buckland, D. D.; Lord Colchester; J. W. Croker, Esq.; W. H. Fitton, M. D.; Rev. E. Goodenough, D. D.; John Guillemard, Esq.; John Ayrton Paris, M. D.; P. M. Roget, M. D.; Capt. E. Sabine, R. N.; *Council.*

Arrangements are soon to be in progress to have weekly meetings of scientific men every Thursday morning at the Society's

apartments, when breakfast will be provided. It is likewise reported that the president intends to have Sunday evening meetings.

London Mechanics' Institution.—Wednesday, 28th Nov., Dr. Birkbeck delivered a lecture on the ancient and modern methods of preserving animal substances, in which he introduced to the notice of the members several mummies of great antiquity, one from Egypt, two from Teneriffe, and one from Mr. Brooks's Museum in Blenheim Street. On Friday the 30th Nov., Mr. Partington delivered a lecture on friction, and the means of diminishing its effects on machinery.

Wednesday, the 5th December, a quarterly general meeting of the members was held, to receive the committee's report, a short account of which we shall give in our next number. At the meeting it was announced, that on Friday, the 7th December, Mr. Lingard would deliver the first of a short course of lectures on the *Cause of the Decay in Timber;* and on Wednesday the 12th December, Dr. Birkbeck would deliver a lecture on the *Manufacture of Paper.*

On Coating Iron with Copper, and on burning Anthracite in Steam Engine Furnaces.

(From the Franklin Journal.)

Sir,—When I wrote to you on the subject of coating iron with copper, I had not that object so much in view, as the making a hit at the host of patent-mongers, who so frequently abuse the privileges intended for ingenious and industrious men, by the patent laws, in taking out patents for alleged discoveries and inventions, which embrace processes long known, and many of them in general use; thus defrauding the public, and annoying the industrious and ingenious mechanic.

With regard to the coating of iron with copper, I will briefly state, that I am no coppersmith, and not much of a chemist; but my experience on the subject, is this: during the last war, I was largely engaged in the manufacture of iron, and was applied to roll a quantity of sheet copper for the sheathing of vessels, and other purposes; and when it was rolled to the proper thickness, in order to give it that bright appearance exhibited on the face of the imported copper, I prepared a cistern of water, and when the sheets were heated to a common red heat, plunged them in, which removed the scale, or oxide, from the surface, and answered the two-fold purpose, of leaving it bright, and soft. After finishing the copper, we resumed our usual occupation of rolling sheet iron—the workmen in removing the scraps or trimmings of the sheet iron, from the shears to the scrap heap, let some of them accidently fall into the cistern, and remain there: some time afterwards, when I was about to have the cistern removed, I noticed the scraps in the bottom, and that they had the appearance of copper; I took them out, and found them completely coated; I then threw some more into the cistern, and after they had been there some time, I do not recollect how long, I examined them, and found them likewise coated; I then concluded, there could be no mistake in the business, and thus the thing has remained, without any further trials. I have occasionally mentioned it to individuals,

but do not know that any of them ever repeated the experiment, or made any use of the hint.

In your remarks on the use of anthracite coal, you state it is your belief, that the engine at Phœnix works, was not constructed with a view to its use; as I had an agency in the erection of those works, I think it may not be improper for me to state, that they were constructed with a particular view to that object. I do not, however, pretend to any great secret on the subject; to use anthracite for generating steam, it is only necessary to know, that the flame, or heat, will not extend so far from the grate, as that from wood or bituminous coal, so as to be sufficiently intense to raise steam; consequently, the boilers and flues must be made shorter, or, if cylinder boilers are used of the usual length, the fire beds and grates must be placed at each end of them, which is the case at Phœnixville; any additional length of boiler, above what is really necessary, operates, in all cases, to act as a condenser upon the remaining part. I have put up a number of steam engines of the largest class in the western country, and some on this side of the mountains, and I can with truth say, I know of no fuel that will generate steam so fast as the anthracite coal, when properly applied. Respectfully yours,

JOSHUA MALIN.

NOVEL USE OF THE PLOUGH.—Mr. Bruckmann states that he has long thought the plough might be used in levelling roads and clearing the foundations for fortifications. In 1824 he had an opportunity of applying it in the construction of a canal, required to furnish a motive force for the service of the rock-salt works of Freedrichshall. The bed was to have a section of seven hundred square feet, and it had been calculated that the excavations would require two hundred men for two years, whereas the King of Wurtemburg wished it to be done in one year from the Spring of 1824.

Three ploughs were employed; the first had two handles, a coulter, and a share, the latter being in the form of a wedge. This plough was preferred in the beds and gravelly grounds; and it was found advantageous to give it an oscillatory movement by the handles during its progress. Drawn by eight horses, it could turn up 25,000 cubic feet of an argillaceous soil in three hours; with ten horses it turned up 19,800 cubic feet of a gravelly soil in the same time. This plough was tried, in 1815, against fifteen others of the ordinary kind, in the construction of a water-course for a mill; all the fifteen were quickly broken by the work. The second plough had two handles and a coulter, but the share had only one cutting edge, which was rounded and with an ear. It was made five times as strong as an ordinary plough, and succeeded well in compact and argillaceous soils, where, with eight horses and four men, it moved 48,000 cubic feet of earth in three hours. In case of fracture, ten minutes sufficed to change the coulter and share; and, during the work, 2,300,000 cubic feet of earth were loosened by it. The third plough was smaller and lighter; it had two handles, a coulter, an ear, and a share, the latter lancet-shaped. It was used for excavating the sides of the canal, on which

the horses attached to the first plough found it difficult to walk, because of the inclination. It was worked by ten or twelve men.

To establish an accurate comparison between the work of these ploughs and that done by the pickaxe and spade, a piece of ground was wrought solely in the latter manner by six strong working men. The result of a long trial was the breaking of one hundred and fifty cubic feet of ground by each man in nine hours. Comparing this work with the work of the ploughs, the following are the results. —The first plough did the work of four hundred and seventy-seven men, the second of nine hundred and sixty men, and the third that of fifty or sixty men. The canal was finished on April 30th, 1825, the ploughs having saved 32,000 days, according to the work-day of a labourer.—Bull. Univ. D. vii. 343.

Recovery from suspended Animation.—A case is reported in the Bulletin Universelle by a French physician, M. Bourgeois, showing the importance of never abandoning all hope of success in restoring animation. A person, who had been twenty minutes under water, was treated in the usual way for the space of an hour, without success; when a ligature being applied to the arm, above a vein that had been previously opened, ten ounces of blood were withdrawn, after which the circulation and respiration gradually returned, though accompanied by the most dreadful convulsions. A second and a third bleeding was had recourse to, which brought about a favourable sleep, and ultimate recovery on the ensuing day. The public will feel much obliged to M. Bourgeois for his perseverance in so interesting a branch of his profession. *London Weekly Review.*

TO OUR READERS AND CORRESPONDENTS

Composition of Forces.—A Correspondent inquires the practical means adopted by Mr. Charles Holtzapfell in the formation of the apparatus described in our last Number under this head.

Derosne's Still has been inadvertently omitted in the present and preceding Numbers, but is in preparation to appear in our next.

Our Durham Correspondent's favour on Cranes is not sufficiently explicit for publication; besides, the application of Bramah's press to such purposes has already been made.

We think the subject of M. G.'s favour is scarcely worthy of so lengthened a discussion in our pages.

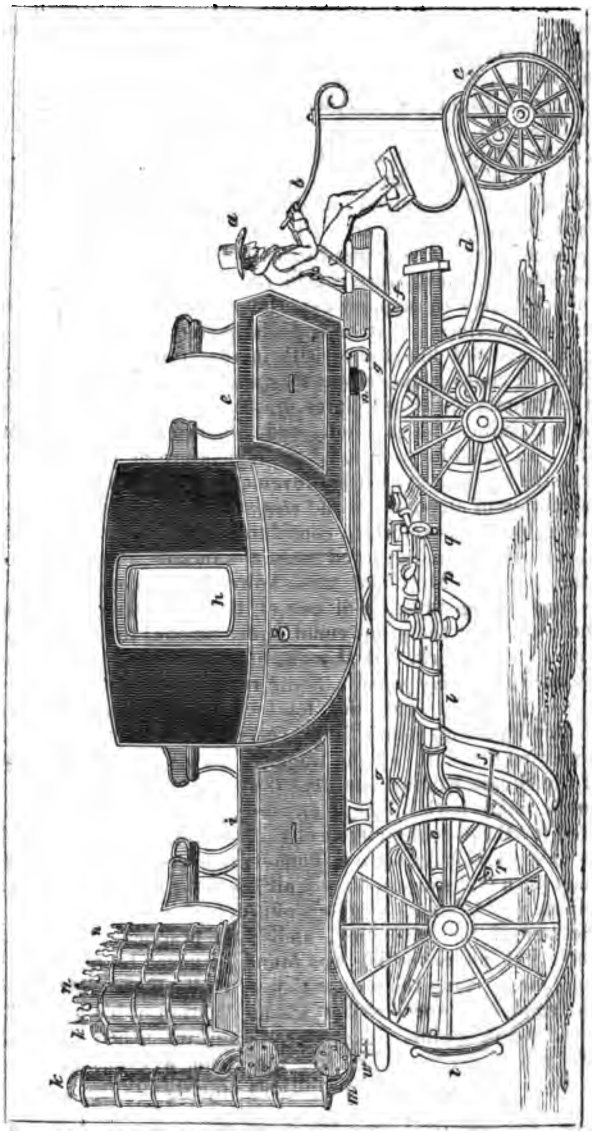
The letter of C on the American inventors in this country is too personal: had it related more to the points of science involved, it would have been acceptable.

A note for Mr. St. C— is left at our Publishers.

The communications of Messrs. Chas. Ricketts, James Barlow, and W. I. W. are received.

A Correspondent (Q) has sent us the following tribute to the departed spirit of Technologia—which we have put in this place, as poetry is about as foreign to our work as perpetual motion: we don't understand either, and would recommend Q to send such effusions in future to some of our contemporaries, whom we need not name:—

Alas, poor Gill!
Thou'st had thy fill!
When perpetual motion was thy will,
Nobly thou fought for't, with thy quill;
But now! thy *crane* and cranium's still!!
Alas, poor Gill!!!



GURNEY'S STEAM CARRIAGE.

GURNEY'S STEAM CARRIAGE.

As the subject of steam carriages is one of great public interest at the present moment, and as a considerable degree of misunderstanding prevails respecting the origin and progress of this branch of practical mechanics, we propose, previous to describing Mr. Gurney's machine, to give a slight chronological account, of the inventions of those projectors who have preceded him, or are now engaged, in attempting to accomplish this important desideratum.

In 1772 the late Oliver Evans, of Philadelphia, while apprentice to a wheelwright, first conceived the idea of propelling land carriages without employing animal power. All the modes that have since been tried, such as the wind, treadles with ratchet wheels, cranks, &c. to be worked by men, were considered too futile by him to deserve a trial; by some subsequent experiments with steam at a high pressure he was convinced that he had discovered a suitable power: upon which he renewed his studies with increased ardour, and soon declared that he could make *steam waggons*. This assertion drew upon him the ridicule of his associates, but convinced of its feasibility himself, he maintained his position, and confirmed it by numerous experiments. In 1786 he petitioned the legislature of Pennsylvania for the exclusive right to use his improvements in the steam engine, in the construction of steam mills and *steam waggons*: the committee to whom the subject was referred, considered him insane as regarded the latter proposition, and granted only the former. A similar petition to the state of Maryland was, however, successful in both points, owing to the good sense of one of the members of the committee, who urged that the grant could injure no one, that he did not think any man in the world had thought of such a thing before, that it might *produce something good*. These reasons obtained a grant to Oliver Evans, in May, 1787, for fourteen years. An interesting account of this ingenious man's improvements in the steam engine, and his experiments with steam waggons, is given in Galloway's History of the Steam Engine, pp. 94-101.

The public mind both in England and America was not at that time adapted for the encouragement of such an undertaking, and Mr. Evans's pecuniary resources were inadequate to overcome the obstacles which he met with in his proceedings; although the public trials made in Philadelphia of his steam waggons afforded demonstrative proofs to scientific men of their economy, and of the practicability of their construction; but no capitalist was found disposed to advance the requisite sum for carrying the proposition into full effect. Mr. Evans being at the same time successful in the application of his admirable high-pressure steam engine, (described in vol. iv. p. 301, Register of Arts,) to propel boats, mills, &c. the steam waggons were laid aside for a more convenient and propitious opportunity.*

* It is proper to notice here that Mr. James Watt, in 1784, included in one of his patents a steam carriage; but this great man was in the habit of recording in his patents every crude idea that suggested itself to him, and from the absurdity of *some* of them, obviously without trying their practicability: no steam carriage was, we believe, ever made or ever described by him.

In 1802 Messrs. Trevithick and Vivian proposed to adapt their high pressure engine to propel carriages on the common road: the form of their carriage resembled the common stage coach. The cylinder and boiler in a horizontal position were placed behind the carriage, and made to vibrate on pivots, so as to follow the revolution of the crank.—(see Register of Arts, vol. iv. p. 441.)

In 1804 Messrs. Trevithick and Vivian's locomotive engine was successfully applied to the Merthyr Tydvil Rail-road, South Wales. —(Ibid.)

In 1811 some improvements upon Trevithick and Vivian's plans were introduced by Mr. Blenkinsopp, of Middleton Colliery, near Leeds.—(described Register of Arts, vol. iv. p. 443.)

In 1813 Mr. William Brunton, of Butterly Iron Works, took out a patent for a locomotive machine, in which were *first* introduced the propellers, in imitation of the action of horses legs and feet. This contrivance was materially improved upon by Mr. David Gordon, and was subsequently adopted by Mr. Gurney, with but little variation.—(described Register of Arts, vol. iv. p. 444.)

In 1814 Mr. Thomas Tudal, of York, took out patents for improved steam carriages, which we shall probably describe at an early opportunity.

In 1815, Messrs. Dodd and Stephenson introduced their patent improvements, which resembled Trevithick's, with respect to the contact of surfaces to obtain propulsion; described vol. iv. Register of Arts, page 445.

In 1816, Messrs. Losh and Stevenson took out patents for further improvements, which consisted in a mode of supporting the weight of the engine and machinery on pistons, moveable in vertical cylinders, filled with steam, which acted as springs possessing the nicest elasticity. Ibid 446.

In 1821, Mr. Julius Griffith, of Brompton, Middlesex, patented a new and very ingenious arrangement for a locomotive carriage: it was the first, in which the engines and machinery were placed upon springs. We hope to be able, ere long, to furnish a description of this machine.

In 1823, Mr. Samuel Brown, applied his gas-vacuum engine to the propulsion of a carriage, which has made several public experiments.

In the same year, Mr. James, sen. patented some new contrivances, applied to locomotive carriages on railways. (Described Register of Arts, N°. 40.)

In 1824, Mr. W. H. James, of Birmingham, (and Thavies Inn, London,) introduced some valuable improvements, and subsequently, an excellent boiler and propelling machinery, all of which are patented, and accurately described in Nos. 73 and 99, Register of Arts.

In the same year, Mr. David Gordon, of Claremont Square, London, patented his new arrangements, which are fully described, with engravings, in No. 45, Register of Arts.

In 1825, Messrs. Burstall and Hill, of Southwark, produced

their first locomotive carriage; described, with figures, in the new series of this work, N°. 2.

In the same year, Major M'Curdy applied his steam apparatus to a carriage, for the common road.

In 1826, Mr. Gurney commenced the application of his patent steam generating apparatus, to locomotive purposes.

In the same year, Messrs. Burstall and Hill took out their second patent for further improvements; a carriage, according to which, is built, and is undergoing alterations from time to time, as suggested by repeated experiments.

In the present year, Mr. James Neville, of Shad Thames, has undertaken and patented, a peculiar construction of locomotive steam carriages.

Also this year, Mr. Frederick Andrews, of Stanford Rivers, Essex, a new patent invention, for a similar object.

There are now building, or altering, in London only, the following steam carriages, of different constructions: *Gordon's, James's, Gurney's, Burstall's, Brown's*, Hancock's, (of Stratford, not mentioned before,) also Beale's, (Commercial Road, not mentioned before,) besides several others, respecting which, our information must at present remain private.

It is likewise to be observed, that the preceding list of locomotive projectors, falls far short of the whole of them; they include only such as occurred to our memory, or were of easy reference to us, by having already appeared in this work. Our readers may be assured of our giving them the earliest intelligence, of whatever experiments may take place of importance, among these horseless charioteers, and that their vehicles shall be all faithfully described and *registered* by us.

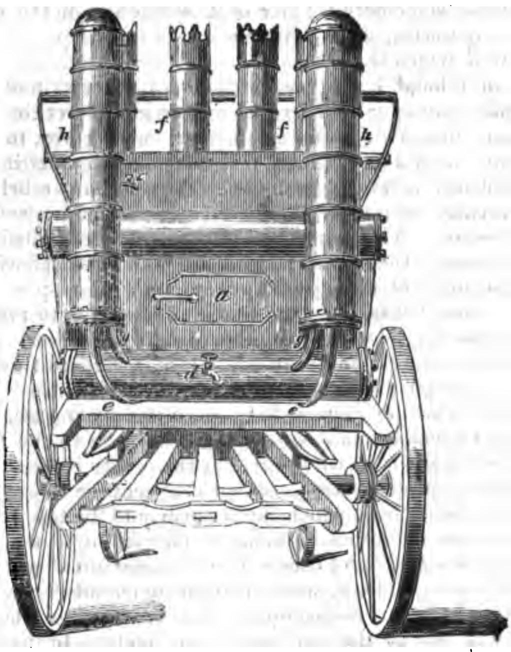
We shall now proceed to describe Mr. Gurney's machine, in doing which we shall for the most part avail ourselves of the descriptions that have appeared in the contemporary publications which have apparently been given under that gentleman's sanction, because the apparatus differs widely from what is specified in Mr. Gurney's enrolled patents. These patents we have long intended to insert an account of in the Register, but learning from time to time that Mr. Gurney had abandoned their application for the most part in his present vehicle, we have lately considered the task as supererogatory. The *propelling* apparatus, patented by Mr. Gurney, was in many respects a combination of Trevithick and Brunton's improvements, and it was by means of legs or crutches that he proposed to propel the carriage; but it now appears that he applies the power direct to the axles, and only uses the propelling crutches in going up hill. The vibrating cylinder described in the specification, is also dispensed with, and two fixed cylinders are placed horizontally with their pistons, working a crank at right angles, which operates upon the naves of the hind wheels, greatly resembling Mr. James's patent, described in our 99th number; and from the accounts given by our contemporaries of Mr. Gurney's boiler, it would appear that he does not employ either of the forms specified in his patent. The following description

of the boiler and machinery, we give *in the words* and on the authority of our contemporaries, after stripping it as much as possible of the surplusage with which it is clogged.

This is a tubular boiler, composed of a succession of welded iron pipes, about forty in number, extending in a direct line, and in a row, at equal distances from a small reservoir of water, to the distance of about a yard and a half, and then curving over in a semicircle of about half a yard in diameter, returning in parallel lines to the pipes beneath, to a reservoir above, thus forming a sort of inverted horse-shoe. This horse-shoe of pipes forms the boiler, and the space between is the furnace; the whole being inclosed with sheet iron. The strength of the pipes is proved by a steam-pressure five hundred times more than can ever be required, so as to prevent all liability to rupture. The water is first sent from the reservoirs into the pipes, where being converted into steam it ascends through the pipes to the upper part of the reservoir, carrying with it a portion to the separators, which of course descends to the lower part, and returns to fill the pipes which have been exhausted by the evaporation of the steam—the steam above pressing it down with an elastic force, so as to keep the pipes constantly full. In the centre of the *separators* are perforated steam pipes, which ascend nearly to the tops; through these pipes the steam descends, and is conducted by one main pipe all along under the carriage to the end of the platform, which is, in point of fact, the outer tank, where it turns under till it reaches two large branch pipes, which communicate with the cylinders, the pistons in which give motion to the machinery, and rotation to the wheels; a force pump is also worked by the engine, which keeps the boiler constantly full of water.

The tank is to be replenished at the end of certain stages; it is calculated to hold sufficient (sixty gallons) for one hour's consumption. The furnace, within the boiler, will contain a sufficient supply of coke or charcoal for a similar period. In form this vehicle is similar to the ordinary stage coaches; but rather larger, and stands higher, the roof being nine feet from the ground. The seats for the outside passengers are as usual: to prevent those who ride in the back seats being annoyed by smoke, coke or charcoal is the only fuel employed, and it is expected that the progress of the carriage will leave behind the heated air and gaseous matters arising from the flues.

The carriage is constructed for accommodating 6 inside and 15 outside passengers, independent of the guide, who is also the engineer. In front of the coach is a very capacious boot, while behind, that which assumes the appearance of a boot is the case for the boiler and the furnace, from which no inconvenience is experienced by the outside passenger, although in cold weather a certain degree of heat may be obtained if required. The length of the vehicle, from end to end, is fifteen feet, and with the pole and pilot wheels twenty feet. The diameter of the hind wheels is five feet; of the front wheels three feet nine inches; and of the pilot wheels three feet. There is a treble perch by which the machinery is supported, and beneath which two propellers, in going up a hill, may be set in



motion, somewhat similar to the action of a horse's legs under similar circumstances, which assist in forcing the carriage to the summit. In descending a hill, there is a break fixed on the hind wheel to increase the friction; but independent of this, the guide has the power of lessening the force of the steam to any extent, by means of the lever at his right hand, which operates upon the *throttle valve*; and by which he may stop the action of the steam altogether, and effect a counter vacuum in the cylinders. By this means also, he regulates the rate of progress on the road. There is another lever, by which he can stop the vehicle *instanter*, and in a moment reverse the motion of the wheels, so as to prevent accident, as is the practice with the paddles of steam vessels. The duty of the guide, who sits in front, is to keep the vehicle in its proper course, which he does by means of the pilot wheels acting upon the pole.

The total weight of the carriage and all its apparatus is estimated at one and a half tons, and its wear and tear of the road, as compared with a carriage drawn by four horses, as one is to six. The engine has a twelve-horse power, but may be increased to sixteen; the actual power in use, except in ascending a hill, is eight horses.

Explanation of letters of reference in Fig. 1, which gives a side view of the machine. *a* the guide and engineer, to whom the whole management of the machinery and conduct of the carriage is entrusted. Besides this man a guard will be employed, whose duty it will be to

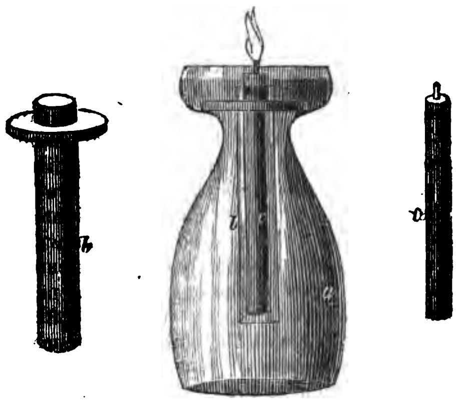
look after the luggage and passengers. *b* the handle, which guides the pole and pilot wheels; *c* the pilot wheels; *d* the pole; *e* the fore boot, for luggage; *f* the throttle valve of the main steam pipe, which, by means of the handle, is opened or closed at pleasure, the power of the steam and the progress of the carriage being thereby regulated, from one to ten or twenty miles per hour; *g* the tank for water, running from end to end, and the full breadth of the carriage; it will contain sixty gallons of water; *h* the carriage, painted claret colour, and lined with cloth of the same hue, capable of holding six inside passengers: outside passengers, of which the present carriage will carry fifteen; *i* the hind boot, containing the boiler and furnace: it is encased with sheet iron, and between the pipes the coke and charcoal are put, the front being closed in the ordinary way (as seen in Fig. 2), with an iron door. The pipes extend from the cylindrical reservoir of water at the bottom to the cylindrical chamber for steam at the top, forming a succession of lines something like a horse-shoe turned edgeways. The steam enters the "separators" through large pipes, and is thence conducted to its proper destination; *k k* separators, in which the steam is separated from the water, the water descending and returning to the boiler, while the steam ascends, and is forced into the steam pipes of the engine; *l* the pump, by which the water is pumped from the tank, by means of a flexible hose, to the reservoir, communicating with the boiler; *m* the main steam pipe, descending from the "separators," and proceeding in a direct line under the body of the coach to the "throttle valve," and thence, under the tank, to the cylinders; *n n* flues of the furnace, four in number; *o* the perches, of which there are three, conjoined, to support the machinery; *p* the cylinders: there is one between each perch; *q* valve motion, admitting steam alternately to each side of the pistons; *r* cranks, operating on the axle; at the ends of the axle are crotches which, as the axle turns round, catch projecting pieces of iron on the boxes of the wheels, and give them the rotary motion: the hind wheels only are thus operated upon; *s* propellers, used as the carriage ascends a hill; *t* the drag, which is applied to increase the friction on the wheel in going down a hill: this is also assisted by diminishing the pressure of the steam, or, if necessary, inverting the motion of the wheels; *u* the clutch, by which the wheel is sent round; *v* the safety valve, which regulates the proper pressure of the steam in the pipe; *w* the orifice for filling the tank: this is done by means of a flexible hose and a funnel, and occupies but a few seconds.

Explanation of letters of reference in Fig. 2, which exhibits a back view of the carriage, and the perches that support the machinery, not here introduced. *a* the furnace door; *c* guage cock; *d* blow cock: *e e* steam pipes; *f f* flues to furnace: *g g* the pipes through which the water is propelled from the separators *h h* into the boiler.

We understand that Mr. Gurney does not expect to get a steam carriage on the public roads for hire till the month of May next; previous to that period, the excursions with his present carriage will be entirely experimental. In the recent trials made in Regent's Park, we are informed that a speed equal to eight miles an hour was ac-

complished, but that Mr. G. will not be satisfied until he has attained a speed of twelve miles an hour.

Mr. Gordon's steam carriage is finished and will probably make its first excursion in about a week. An improved modification of the machinery of this carriage (described in our 45th number,) has been made, which makes it a very great favourite with us. In our next we hope to give a full description of it.



DURHAM NIGHT LIGHTS.

St. John's College, Cambridge, Dec. 6th, 1827.

SIR—I take the liberty of sending you an account of a small invention of a man (whose name I do not know) at Newcastle-upon-Tyne, which it will give me great pleasure to see inserted in your Register, if you think it of sufficient general utility. It consists of a glass vessel, very like the glasses into which bulbous flower roots are put in winter, only it bulges out nearer to the top. In the neck of it is placed a glass tube, open at both ends, of sufficient diameter to contain a small wax taper, having a rim placed a little way below the top, of sufficient size to prevent the tube falling down into the lower part of the outer vessel. The method of using it is to fill the outer vessel with water, so as just to cover the top of the tube; then place a wax taper in the tube, and it will sink so as to be just above the top of the water at the end.

When the taper is lighted, it will rise in the water, and continue burning until the whole of the wax, except a very thin shell remains. I subjoin a slight sketch, and will just say, that the only use of the inner tube is to hold the taper upright in the water.

a is the bottle filled with water to the height delineated; *b* the tube suspended therein by means of the collar surrounding it, which rests upon the neck of the bottle: *c* is the wax taper floating perpendicularly within the tube; with its lighted upper extremity just above the surface of the water. To prevent the possibility of mis-

conception, separate figures are given of *b* and *c*; besides these, there is nothing but the bottle of water *a*.

This contrivance is used very much in the county of Durham for night lights, and found to answer extremely well.

Believe me, &c. your constant reader,

CACALE.

N. B.—A description of the Machinery used by Mr. I. G. Lambton (M. P. for the County of Durham), for raising the coal from the barges and putting it into the ships, I shall be happy to see in the Register of Arts.

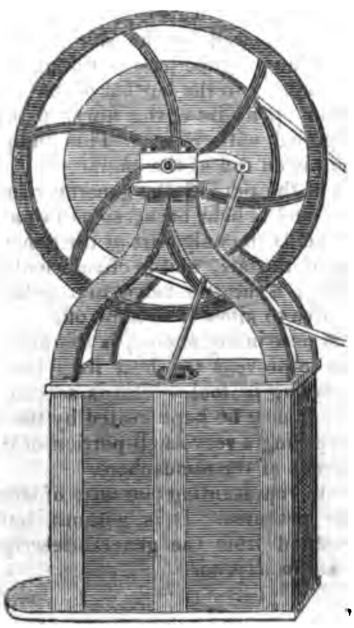
AMERICAN PATENT STEAM ENGINE.

By WARREN P. WING, *of Massachusetts*, August, 1827.

To all to whom these preents shall come, be it known that I, Warren P. Wing, a citizen of the United States of America, have invented a new and useful improvement in the steam engine, by which it is rendered more simple and compact than heretofore, and in which, the fuel is used with great economy. For which invention and improvement, I claim a patent according to the laws of the United States.

And I the said Warren P. Wing, do hereby declare that the nature of my said invention and improvement, and the manner in which the same may be carried into effect, are fully made known, in the following description and specification.

The dimensions of my improved engine may vary according



to the power which may be required, and its form may be varied according to the taste, or wishes of those who use it. For the sake of facility of description, I will give the dimensions of one which I have made, and which after a fair trial, has been found to answer well in practice.

The furnace is of cast-iron, it is two feet nine inches long, one foot four inches wide, and two foot two inches high; and its appearance resembles the common stove used for warming apartments; it may be made of sheet-iron, or built entirely of brick: when made of metal, it should be lined with fire-clay or bricks. Within this furnace is placed the generator, which consists of a tube of metal, joined by flanches, or otherwise, so as to extend from twenty to forty feet in length, making several revolutions within the furnace, in the manner of the worm of a still; this tube in the engine described, has an internal diameter of about three quarters of an inch, and is made sufficiently thick to sustain the pressure of highly elastic steam.

The cylinder is about three inches in diameter, with a stroke of about eleven inches; this stands upon the furnace, the centre of the upper plate of which is perforated, so as to admit the lower end of the cylinder, to come in contact with the fire, to sustain the heat of the steam. This cylinder is open at top and closed at bottom, in the manner of the old atmospheric engine, it being a single stroke engine. I sometimes intend to use two cylinders, with a lever beam, in which case the power of the engine will be doubled. With the single cylinder, I use a slide, to guide the piston rod and to attach the pitman rods to a fly wheel, in the usual manner.

A forcing pump is placed by the side of the cylinder; from the bottom of this pump a tube passes through the top of the furnace, and through the fire, to the bottom of the furnace, where it is connected with, and opens into, the lower part of the generator, which it keeps supplied with water. This pump is worked by a connexion with the piston rod of the engine.

The upper part of the tube of the generator, passes out from the side of the furnace, and is bent back, so as to pass into the bottom of the cylinder. This is the only part of the generator, which is exposed to the action of the air, and is of sufficient length only to admit of a safety valve; a throttle valve to regulate the steam, and a cork, or sliding valve to allow it to blow off.

What I claim as new in my engine, is the arrangement of the respective parts so as to prevent the heat from being dissipated, and thus to produce a saving in fuel. This is accomplished, by placing the cylinder so that it may be kept heated by the direct influence of the fire; and by exposing a very small portion of the induction tube, to the cooling influence of the atmosphere.

The annexed cut, representing one form of this engine, has been sent to us by the patentee. It is without letters of reference, but may be understood from the general description given in the specification.—*Franklin Journal.*

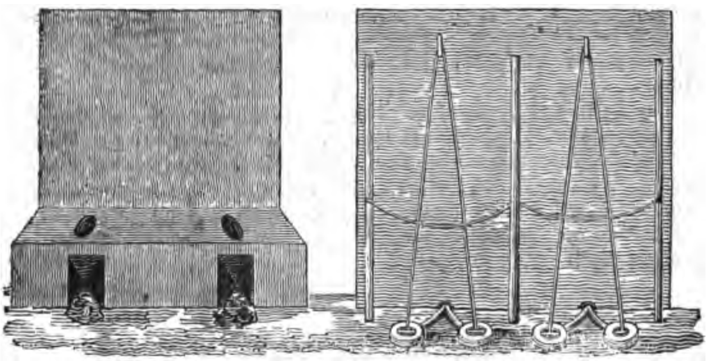
COMPARATIVE VIEW OF

FOREIGN AND BRITISH MACHINERY, AND PROCESSES IN THE ARTS.

CEYLON. N°. XI.—[Continued from page 235.]

SINGALESE IRON FOUNDERY.

Ores of iron and of manganese are the only ones that have yet been discovered in Ceylon. With the mode of reducing the former, and of working the iron which they extract, the natives are well acquainted. Their process of smelting the iron, like most of their other processes, is chiefly remarkable for its simplicity. The most complete Singalese smelting-house visited by Dr. Davy consisted of two small furnaces under a thatched shed.



Each furnace, at its mouth, was about one foot four inches, by eight inches in diameter; about three feet deep, and terminated in the form of a funnel, over a shallow pit inclining outwards. They were made in a bed of clay about three feet high and three feet wide, against which a light wall, about ten feet high, was raised, to protect the bellows and operator, who were situated immediately behind. Each bellows consisted of a circular rim of wood, about six inches in diameter, and scarcely two high, fixed on a clay floor, and covered with moist cow-hide; in the centre of which was a hole to admit air, and to receive a cross stick, to which a cord was attached, that was fastened above to an elastic stick. Each pair of bellows was worked by a boy, who rested his back against a rope, for the purpose of support, and stepped alternately from the orifice of one bellows on to that of the other, at each step forcing a blast of air into the furnace through a tube of bamboo. The furnaces were charged with a mixture of iron ore, broken into small pieces, and charcoal. The fires were kept up as strong as possible, till the ore was reduced, and the fused metal collected in a cake in the ash-pit. Here the labours of the smelter terminated: he sold the crude metal, without subjecting it to any farther operations, leaving it to the blacksmith to purify and bring it to a malleable state for working.

It is generally remarked, that the ruder the method employed in any country for the reduction of iron, the better the quality of the metal is: the observation holds good in Ceylon; and there is a pretty obvious reason why it should be correct. Where the art is little advanced, the most tractable ores must be selected, and charcoal is the fuel always used,—circumstances alone which are sufficient to account for the iron obtained being excellent.

The mode of purifying the metal employed by the blacksmith, consists merely in the repeated operation of heating it in a charcoal fire, and of hammering it till it is sufficiently malleable. Whether the Singalese know how to make steel, Dr. Davy did not ascertain in a satisfactory manner: they are, however, in the constant practice of case-hardening, which they accomplish by cementing the soft iron, covered with a paste composed of a variety of vegetables, in a charcoal fire. It is of little consequence, probably, what vegetables are used for the purpose, though the artist, who considers the process a mystery, and keeps the particulars of it secret, is of a different opinion.

The British methods of smelting and preparing iron and steel are described under various patent specifications distributed throughout the first and second series of this work; but for a connected general account, we cannot do better than refer our foreign readers to No. 87 of our fourth volume (first series), in which is given the substance of a lecture on the subject, delivered at the London Mechanics' Institution, by its learned President.

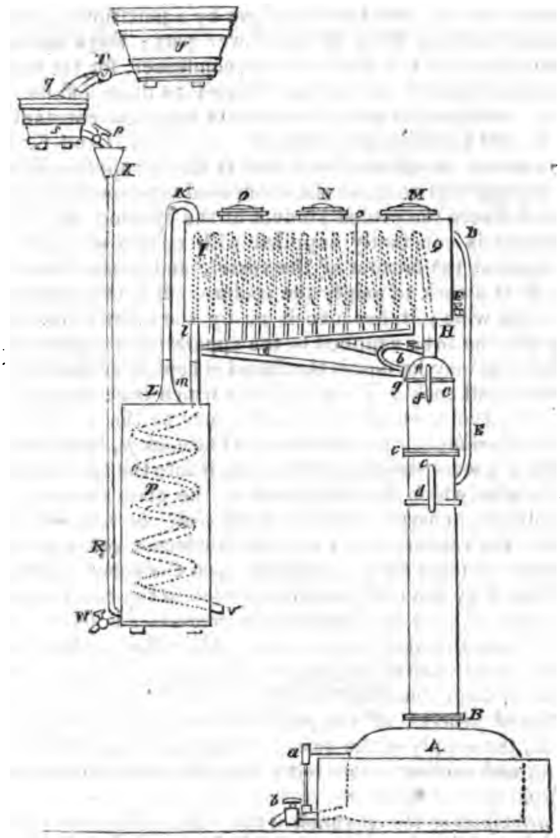
(To be continued.)

DEROSNE'S STILL.

(being a continuation of the account of the most improved French Stills given at p. 222.)

This much extolled apparatus consists of seven vessels or parts performing separate offices; namely, a boiler A; a distilling column B C; a rectificator C C; a condenser I Q; refrigerator p; a reservoir s; in which the supply from another vessel U, is regulated.

It is considered preferable to have two coppers like that at A, set in the masonry close to each other, so that the heated air from the burning fuel under one copper, may be conducted under the other. Two communications are also to be made between the two coppers; first, by a pipe, proceeding from the bottom of A, to the upper part of the other; second, by another pipe rising from the top of the latter (not represented) and descending through the top of A to the bottom of the vessel, to carry all the vapour generated underneath the liquid therein. At a, b, is a glass tube to shew the exact height of the liquid in the copper. The interior of the distillery column B C, where the separation of the alcohol takes place, is full of shelves perforated with small holes; through which the vapour from A necessarily passes as it ascends, and comes in contact with the wine or liquid to be distilled that passes through the same apertures; both the wine and the vapour are thus retarded in their progress, and



become intimately mixed. The small tube *e d*, is of glass, to shew the state of the process going forward in the column C C, called the rectificator, and is only an extension upwards of the column beneath, containing similar perforated shelves, and provided with a glass tube *e f*, to shew the state of the process in this part. The vapour rising to the top of the rectificator passes out through the neck *H* into a long worm, coiled horizontally in the condenser I Q, which is a copper cylinder. This vessel contains wine that becomes heated by the vapour passing through the worm. To collect the spirit that becomes condensed in the worm, the lower sides of each coil has an opening into a short tube, of which there are as many, as there are coils in the worm. To these tubes there are cocks to draw off as may be required, the products of any or all of them, (the most distant from the rectificator being of course the strongest spirit,) either into the refrigatory, by the upper long inclined tube represented, or by the lower one, back again into the rectificator for a second rectification. The

condenser is divided into two chambers by a partition *o*, with a communication between them at the lower part; there are also three man-holes closed by lids M N O in the condenser, for the convenience of having it cleansed, and it has a cock F to draw off its contents. The wine contained in the condenser is supplied constantly by the pipe K L, and as constantly flows off by the tube D and E. *p* constitutes the cooler or refrigeratory, and is also a copper cylinder containing a worm that receives the condensed vapours through the pipe *l m*, and delivers the cooled product at the opening V. The worm in the cooler is constantly supplied with cold wine by the pipe R, which enters at the bottom of the vessel, and passes out at the top, at L. W is a cock to empty the cooler. S is the reservoir which contains the wine; it has a cock *p*, by the opening of which the quantity of wine to be supplied to the apparatus is regulated: and in order that this may be equal, the liquid is kept at a uniform height by means of a ball cock *q* T, the pipe to which is connected with the principal reservoir, which for example, may be the vessel V.

Mode of conducting the operation.—The cock *p*, being opened, the wine from U passes through all the vessels into the two coppers to the desired height, which is ascertained by the glass guages. The distilling column is charged with as much wine as will prevent a free passage of the vapour, and when the condenser and cooler are full, the entrance of more wine is stopped, and the communication is not re-established by the cock *p* until the wine in the coppers has parted with its alcohol, and the liquid in the condenser is hot enough to be introduced into the distilling column. After this, a small stream, in proportion to the size of the apparatus and the rapidity of the work is constantly kept running from S, and then begins what is termed the *continued process*, all the previous work being only preparatory. After this, the supply of the vessels with wine, the evaporation, condensation, and cooling, go on independently, requiring only attention to the fire.

The principles of the operation of this still, have been explained and commented upon at great length by Dubrunfaut,* and other eminent writers on the subject, our limits will not allow us to follow them, but we think the rationale consists simply in volatilizing the alcoholic portion of the wine or wash to be distilled, by means of the direct contact of the vapour of water; instead of, as usual, transmitting the heat of steam, to the alcohol, through the medium of a metallic body. As respects the great advantages of *continuous* distillation, we by no means doubt it; but there are other stills that possess this advantage in as eminent a degree; obtained too, by much simpler arrangements: and when M. Dubrunfaut states (as he really does) that the economy of M. Derosne's process is such, as to cost only one fourth of that employed in the most improved stills of Adam and Berard, the absurdity is too great to need refutation. The apparatus has its advantages, but such un-

* A translation of the observations of Dubrunfaut is given in "The Chemist," vol. ii. p. 59. To this able periodical (now defunct to our regret,) we are somewhat indebted in the above account.

qualified commendation has the effect of detracting from its real merits, in the minds of those who do not take the trouble to examine the subject for themselves.

LITERARY AND SCIENTIFIC INSTITUTIONS.

London Mechanics' Institution.—On Wednesday the 12th December, at the conclusion of Dr. Birkbeck's interesting lecture on the *Manufacture of Paper*, in which were introduced and explained, the different apparatus used both in making paper by hand, and by machinery, and several small pieces of paper were made in presence of the members; it was announced that on

Wednesday, the 19th. December, Dr. Mitchell would deliver a Lecture on the *Architectural Antiquities of Greece*, and that on

Friday the 21st. December, Mr. Lingard would deliver his second Lecture on the *Causes of Decay in Timber*; the Theatre being closed on the 14th, to enable the plasterers to complete the repairs of the ceiling.

From the Committee's Report read to the members at the Quarterly Meeting on the 5th December, it appeared that 67 volumes had been added to the Library during the quarter, that the classes for instruction in Writing, Arithmetic, Mathematics, Drawing, Mechanical Philosophy, and Chemistry, the English and French Languages, &c., continue their meetings as usual; that there have been delivered since the beginning of September last, twenty-two Lectures consisting of three courses, and three single Lectures, and that Dr. Birkbeck will commence the second division of his Anatomical Course, in which he will treat of the *Functions of the Human Body*, on Friday the 4th January 1828: that Mr. Hodgskin would commence a course on the *Physiology of the Mind* about the same time. It was also stated that preparations were in progress for the delivery of courses on the Decorative Branch of Civil Architecture, on Chemical Affinity, and the Gases.

The number of members has increased during the quarter, from 1053 to 1238.

Western Literary and Scientific Institution.—The Half Yearly Meeting of this Society, was held in their new Lecture Room 47, Leicester Square, on Monday, the 3rd December, to receive the Committee of Managements' Report, from which it appears that the financial affairs of the Institution are in a flourishing state, notwithstanding their recent heavy charges for erecting a Lecture Room, and other outfittings; that the number of Members is 714; that they have had six courses, consisting of twenty-four Lectures delivered during the half year, that they have weekly meetings of classes for instruction in the French, Italian, and Latin Languages, Mathematics, Music, and Botany. It was also stated, that the Library of the Institution contains 2411 volumes, 431 having been added to it during the last half year.

Mr. Wallis's course of Astronomical Lectures is still in the progress of delivery at this Institution.

CUBIC EQUATIONS.

13th November, 1827.

To the Editor.

Sir,—There were so many errors of the press in the "Solution of certain cubic equations," which appeared in your Number of the 20th of this month, that there was some little difficulty in coming to its right meaning. This was rather fortunate for the discoverer, as, otherwise, "the" (not very intricate) "steps which led to the discovery of it," might have been too quickly developed by a mere tyro in algebra. Its importance, however, appears to me most trifling, and scarcely worth the investigation; since, as one term depends upon another for its value, it can but rarely be of any practical utility, and may be more properly classed among indeterminate problems. The investigation, which I trust will not "occupy too much space,' is simply this.

Given $x^3 + px^2 = y^3$ to find x. Let $x = \frac{y}{s} \therefore \frac{y^3}{s^3} + \frac{py^2}{s^2} = y^3$, $= y^3 + psy^2 = s^3 y^3$, $= p = \frac{s^3 y^3 - y^3}{s \cdot y^2} = \frac{\overline{s^3 - 1}}{s} \cdot y$. Therefore, when p and y have this relation to each other, x must always equal $\frac{y}{s}$, s being any divisor of y. And when $y = 12 \therefore s = 2, 3, 4, 6$, and $p = \frac{\overline{8-1} \cdot 12}{2} = 42$, $\frac{\overline{27-1} \cdot 12}{3} = 104$, &c. &c., and $x = \frac{12}{2} = 6$, $\frac{12}{3} = 4$, &c.

P.

PARADOX IN PNEUMATICS.

To the Editor.

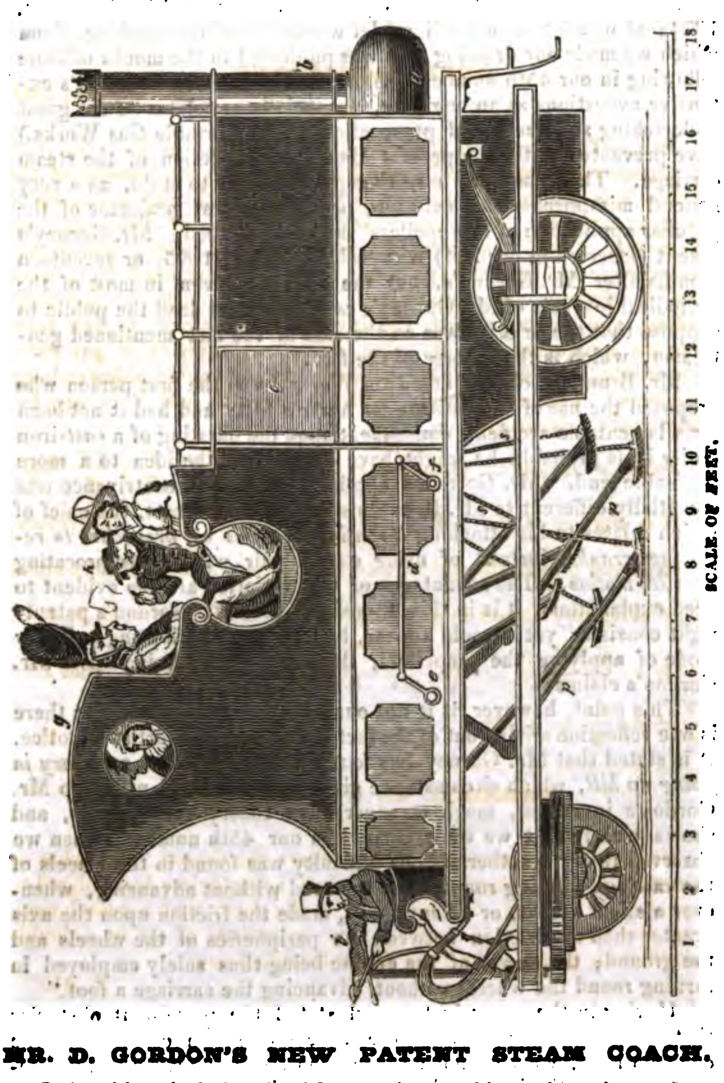
Sir,—Without meaning to controvert the *dogma*, that what is gained in power is lost in time, I shall nevertheless feel obliged to any of your readers, to explain by it the fact, that a vessel may, with *less force*, and in *less time*, be exhausted of air by a double barrelled air pump, than by a single barrelled one.

J. M.

TO OUR READERS AND CORRESPONDENTS.

St. C's Double Cannons, and Mr. B—n's favour are intended for our next.

We would recommend our correspondent Q to set about the construction of his *Steam-horse* in good earnest; we are persuaded that it would gallop delightfully on even ground: for the trot movement each crank ought, we think, to be separate: in making turns in the road, we should be somewhat fearful of its coming on its beam ends by the changing of the centre of gravity: to provide against this difficulty, we would recommend shifting ballast in the form of a leaden ball that should be made to roll from one side of the belly to the other, by the pressure of the heel or spurs of the rider reversing the position of an inclined plane.—We should not have hesitated giving the subject insertion in its present crude state, had not the safety valve been so ludicrously situated as to give it the appearance of a jest that ill accords with the gravity of our work.



MR. D. GORDON'S NEW PATENT STEAM COACH.

In the historical sketch of locomotive machines given in our last number, we expressed a hope of being able to insert in the present, a description of Mr. David Gordon's new patent Steam Carriage: we have now the gratification of fulfilling that obligation to our readers, and of being the medium of conveying intelligence to the public at large, highly important in a national point of view, and exceedingly interesting as descriptive of a very complete and beautiful piece of machinery.

Mr. Gordon's patent for this invention was sealed in December, 1824; at which time a small model was made of the machine, from which we made our drawing that was published in the month of June following in our 45th number. Since that period the inventor's extensive avocations as an engineer, (especially as relates to the great undertaking and successful prosecution of the Portable Gas Works,) have prevented until the present time the completion of the steam carriage. These facts we have thought it proper to state, as a very general misapprehension exists respecting the first projector of the peculiar application of "propellers" herein described. Mr. Gurney's patent (inserted in our last) was sealed in May, 1825, or seventeen months after Mr. Gordon's, but the accounts given in most of the periodical journals of Mr. Gurney's carriage would lead the public to suppose that the priority was on the side of the last mentioned gentleman, which is the reverse of the fact.

Mr. Brunton, of Butterly Iron Works, was the first person who proposed the use of a substitute for horse's feet; and had it not been for a lamentable accident, consequent upon the bursting of a *cast*-iron boiler it is probable he might have prosecuted the idea to a more profitable end. Mr. Gordon's application of this contrivance was essentially different to Mr. Brunton's in several respects, the chief of which relates to his attaching *a continuous series of propellers to revolving cranks,* instead of using only a pair with a reciprocating *parallel motion.* The advantages of this variation are too evident to need explanation; it is in this, therefore, that Mr. Gordon's patent-right consists: yet it would appear, by Mr. Gurney adopting a similar mode of applying the propellers, that he is trespassing upon Mr. Gordon's claims.

This point, however, it is not our intention to discuss; but there is one reflection arising out of the fact, that we think worthy of notice. It is stated that Mr. Gurney has found these propellers *necessary in going up hill,* which circumstance gives a character of utility to Mr. Gordon's invention, much stronger than theory can impress, and shows clearly that we were correct in our 45th number, when we observed that "another serious difficulty was found in the wheels of the carriage slipping round upon the road without advancing, whenever a slight ascent, or a heavy load, made the friction upon the axis greater than the friction between the peripheries of the wheels and the ground; the power of the engine being thus solely employed in turning round the wheels without advancing the carriage a foot."

Having in the paper just quoted stated the prominent obstacles that have hitherto prevented the success of steam carriages on the common road, we shall not enlarge upon that subject here, but proceed to notice the improved modifications, introduced by Mr. Gordon since he took out his patent. These chiefly consist in placing the propellers in the fore part of the carriage instead of behind it; in raising them from the ground by means of a light revolving crank, (having six throws, that being the number of propellers employed,) which effects the operation with undeviating regularity, and by much simpler arrangements than by the eccentrics previously used. The

machinery generally is much simplified, and its adaptations improved. The external form of the carriage is to be materially different; and instead of the caravan form there are to be accommodations for the outside passengers, similar to those in our ordinary stage coaches; but the inside passengers are to sit in a row facing the fore part, in an apartment much resembling that in front of a French *diligence*.

The carriage runs upon only three wheels, one in front, and two behind; and each of them have a separate axle. The latter circumstance affords a great advantage in the hind part of the carriage, where the two wheels are opposite to each other; there being no cross axle an increased capacity is obtained in the body of the carriage, exceedingly useful in the stowing of heavy goods in ordinary cases; but as now employed for locomotion by steam, of the utmost value, as a depository for fuel and water. The wheels roll *perpendicularly* on their axes; between strong parallel bars, which become the bearings of the axes; a considerable degree of friction is thus avoided; while the single wheel in front gives a greater facility of turning, and in a less space, than coaches having two fore wheels. This peculiar construction of the body of a carriage is a distinct patent of Mr. Gordon's, (fully described in the 27th number of the Register of Arts, with engravings) antecedent to the patent for the propelling apparatus now under consideration.

The engines and other machinery rest entirely upon the springs of the carriage, to preserve them from the injurious effects of the concussions made by the wheels upon loose stones, or other obstacles lying on the surface of the road.

In the body of the carriage connected with the piston rods of the engines is a six-throw crank; to these throws or arms are attached the propellers, which by the revolution of the crank are successively forced out against the ground in a backward direction; then drawn up again, precisely in the manner of the hind legs of a horse. The rods are formed of iron tubes filled with wood, to combine lightness with great strength. To the ends of the rods are attached what may be considered as substitutes for horses' feet, although their form being the segments of circles, is very different. They press against the ground by a rolling kind of motion, causing a sufficient adhesion to the surface without digging it up, and adapt themselves to any turn of the carriage. The under part of these feet are formed into short strong brushes, supported by iron teeth, that would take effect in the event of the other part failing.

In going down a hill these propellers are lifted off the ground by the guide at pleasure, so that the carriage proceeds entirely by its own gravity: if the descent should be steep, or the motion too rapid, the guide then makes use of a break, by which the motion can be retarded or entirely stopped. If the carriage is proceeding upon a level, the lifting of the propellers alone stops the carriage gradually, but quickly if ascending an inclined plane. This application of the propellers affords also a very facile means of making a turn in the road, simply by lifting them on one side, and allowing them to act on the other, which is done by the mere pulling of a cord: the guide

has also the power of producing the same effect by turning a lever in front of him, which by means of a pinion, operates upon a toothed sector on the circular frame that surrounds the front wheel: either of these modes may be employed, or both of them in conjunction; thus very great facilities are afforded for making quick and sudden turns in the road.

In countries where sledges are used for travelling over snow, the machine may be placed upon skates, and the feet of the propellers be shod with suitable iron teeth.

The preceding engraving represents a side elevation of the machine.

a, the end of the boiler.

b, the flue.

c, an apartment for the engineer to attend the fire, and regulate the machinery; which apartment contains a store of water, coke, &c.

d, external connecting rod (on each side of the carriage) that unites the driving cranks of the propellers to the small lifting cranks within the carriage.

e being the axis of the driving cranks; and

f, the axis of the lifting cranks.

g, the apartment for the inside passengers, which has glazed windows in front.

h, the seats for the outside passengers.

i, the conductor, who guides the carriage by means of four cross levers, turning a small pinion of seven teeth, that work in a toothed sector, fixed on the periphery of the circular frame.

p p, propellers, of which the whole six are brought into view.

s s, the straps or ropes by which the propellers are successively lifted from the ground.

In our next number we shall give the details of the machinery and boiler, by plans and sections.

DOUBLE SHIP CANNONS.

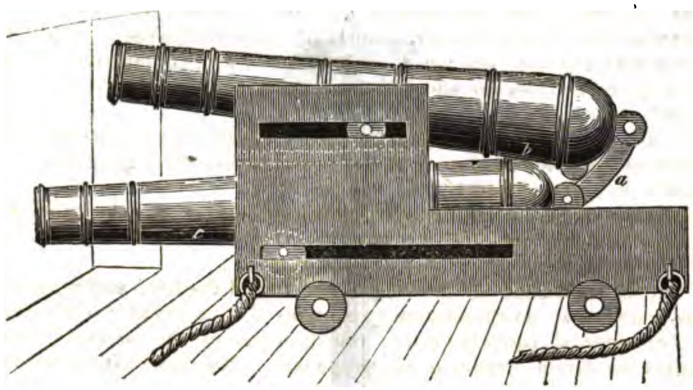
To the Editor.

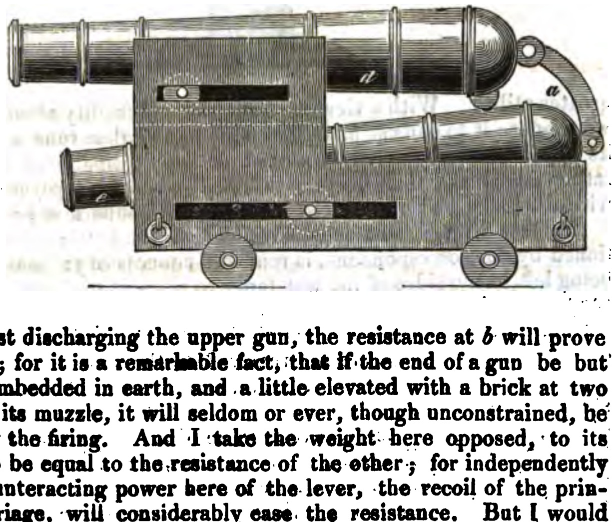
SIR,

THOUGH no sailor, consequently as many may imagine little qualified for such undertakings, yet, as a lover of science, I venture to submit to your notice the enclosed sketch of a double gun, which I have just perfected, in the wish that it may prove serviceable, by way of hint, to others more intimately connected with the subject.

The idea took birth some time since, whilst present during the firing of ship cannon, and I am confident that the suggestion, if adopted, would in a very considerable degree, if not effectually, counteract the violent recoil of guns when heated by constant firing.

Fig. 1. Both guns loaded and ready, the upper pointed at the rigging, and the lower gun at the hull of the enemy. By first discharging the lower gun, its recoil acting on the lever *a*, will raise the end of the upper gun *b* to the level, for a hull shot at the enemy, as at *d* in Fig. 2, and bring the end of the gun at *c*, to the position *e* in Fig. 2.





By first discharging the upper gun, the resistance at *b* will prove sufficient; for it is a remarkable fact, that if the end of a gun be but slightly embedded in earth, and a little elevated with a brick at two feet from its muzzle, it will seldom or ever, though unconstrained, be moved by the firing. And I take the weight here opposed, to its recoil, to be equal to the resistance of the other; for independently of the counteracting power here of the lever, the recoil of the principal carriage, will considerably ease the resistance. But I would not recommend this gun to be fixed in this position, unless at a very great advantage.

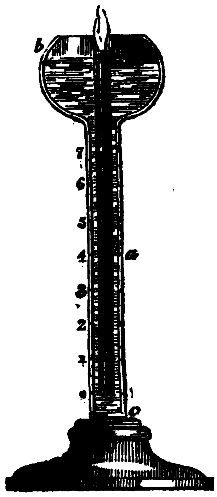
Fig. 2. represents the lower gun as fixed, and the upper one ready for discharging, which, when fixed, the recoil, by acting on the lever *a*, will bring the lower gun to bear as before fixed, as in fig. 1.

London, 30*th Nov*. 1827. St. C.

AN IMPROVED DURHAM NIGHT LIGHT,

Employed also as a Measurer of Time, and as an Alarum.—*By the Editor.*

It has occurred to us that the "Durham Night Light" described in our last by our Cambridge correspondent, "Cacale," might be much simplified, and at the same time be rendered more elegant, and of



greater utility. With a view to *cheapness*, and facility of manufacture, we propose it to consist merely of a graduated glass tube *a*, having at its upper extremity a bulbous head or cup, (capable of containing rather more water than the tube will hold when the taper is out of it); with the lower end *c* cemented in a turned wooden foot or stand.

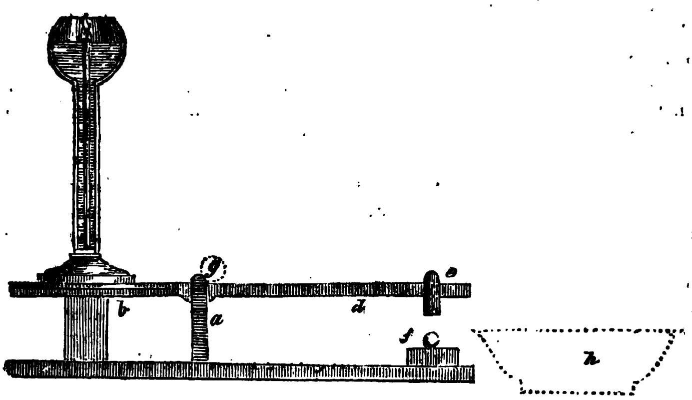
By this arrangement it is obvious that the bottle of water mentioned by our correspondent, is rendered unnecessary; sufficient room being left in the sides of the wax taper to allow it to rise freely within the tube, as it becomes consumed by burning. The column of figures 0 to 7, in the diagram, are merely inserted to explain the divisions on the glass tube; but are not required on the article itself.

It is well known that wax lights, from their great uniformity and steadiness in burning, become tolerable measurers of time: accordingly, we propose the glass tube to be divided by lines, the spaces between which shall be equal to the length of wax taper (of given regulated dimensions) that will be consumed in an hour. Now, if a taper be put into the tube previously filled with water, and the lower extremity of the taper happens to come a little below the graduated line on the scale, a small quantity of water being poured into the cup, the taper will *rise* and be even with it. If, on the contrary, the bottom of the taper is above the line, a small quantity of water taken out of the cup, will cause the taper to *sink* to the right level. An observation of the tube at any time of the night will then show accurately how many hours are past by the quantity of wax consumed; and to make it the more palpable and clear, the wax had better be coloured; green, for instance.

A sliding scale might be made to fit the tube, and be adapted in a moment to the length of the taper and other circumstances; this would, however, add much to the expense, and in our opinion be

more inconvenient than useful. If it be inquired what is to be done with short pieces, without a sliding index; we say, let there be merely a very thin brass ring put round the glass tube, so as to spring to it, and let it rest as represented at *c*, when not in use. Suppose a short piece of taper is now to be consumed, that does not reach below the division 4 or 5 on the scale; slide up the ring then to the level, and reckon from the ring upwards the portion of time past by the vacant space left between the ring and the taper.

An alarum may be easily adapted to this night light, in the manner represented in the following diagram.



a is the fulcrum to a lever of the first class, on the short arm of which *b*, is to be placed the night-light *c*, both being supported by a block underneath, so that the light may stand upright. Over the long arm of the lever *d*, is slided a perforated hammer or weight, until it just counterpoises the opposite arm and its load. It will now be evident that as the wax taper burns away, the burthen on the short arm of the lever will be lightened, and the long arm will preponderate. To regulate this circumsiance so as to cause the alarm to go off at the appointed time, let it be ascertained what weight of the wax taper is consumed in an hour; say, for instance, that it is a drachm; then drachms will represent hours. Suppose now that a person wishes to be called in five hours; having then balanced the light by the sliding weight as before mentioned, put five drachms into the plate that holds the night light; the taper in which losing five drachms weight in five hours, the long arm will descend and set off the alarum. We have now only to describe the method of making the noise, of which there are so many obvious ways besides the ringing of a bell, as to render it difficult to choose; we have, however, represented in our diagram two simple methods, one in full lines, the other in dotted lines. The first is to place a little detonating ball *f* under the hammer, which as it descends will cause it to explode, and awake a very sound sleeper: but as some persons may not relish having their dreams cut short by a report like that of a discharged pistol in their ear: we have shown the other

method (in dotted lines) which consists of a light hollow brass ball *g*, that may be procured at any ironmonger's for a few pence, and let that rest close to the fulcrum of the lever while the latter is at rest. When the period of time arrives, and the long arm of the lever descends, the ball will run down a groove made upon it, into an empty basin *h* placed to receive it, round the centre of which the ball will make several very rapid elliptical orbits, with considerable noise.

NEW PATENT PROP, FOR MASTS,

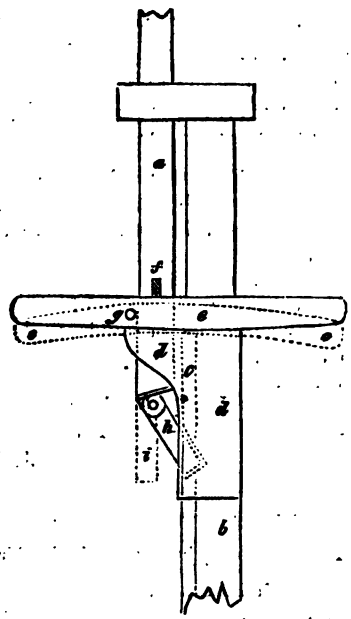
By Benjamin Rotch, Esq. of Furnival's Inn.—*Enrolled September*, 1827.

We have often remarked, that the mechanical inventions of the above-mentioned eminent barrister, are distinguished alike, by extraordinary simplicity in their construction, and great practical utility in their application. The new contrivance we have to notice, is an instance of this fact; for it consists merely of a straight piece of timber, with a hinge joint at one extremity, but applied in a manner so obviously useful, that we instinctively inquire, "how is it that this was never done before." Century after century have rolled away without this appendage, during which time, thousands of top-masts have been swept away by the winds, for the want of it. We anticipate the question, how can a lawyer, of such extensive acquirements and practice, find sufficient time to study, in order to qualify himself to improve our naval architecture? By answering, that we believe Mr. Rotch has made several voyages, during which, it is natural to suppose, that an inventive mind like his, stored with mathematical knowledge, a thorough acquaintance with the theory of mechanics, and with a hand (as we have reason to know) skilled in its execution, could not fail to observe the difficulties and dangers in the working of a ship, to mark the cause which produced the effect, and to suggest a remedy. We say, this is naturally to be expected of a man like the patentee; but it is not to be expected of a seaman, any more, than that the mother of a child shall see its defects, however conspicuous they may be to a stranger.

The annexed cut represents an outline *sketch* of the apparatus, as applied to the masts of a ship.

a is the top mast; *b* the lower mast; *c* the fish, (which is a strong piece of timber fixed to the lower mast to strengthen it) shown in dotted lines; *d* the cheeks of the lower mast, on which are fixed the trestle-trees *e*; *f* the fid of the top mast; *g* a bolt stay to the top mast; *h the new patent prop,* bolted to the heel of the top mast, by means of an iron plate, connected with the hinge joint upon which it turns, the other end resting in an angular cavity made to receive it in the fish of the lower mast; *i* shows the position which the *prop* takes when the top mast is being raised or lowered; the curved dotted lines *o o* represent the form into which the trestle-trees ordinarily become bent by the action of the top mast.

This latter effect is owing to the trestle-trees having to support the whole weight of the top mast, by means of the fid or cross bar *f*, which passes through the top mast, with its ends resting upon the



trestle trees. To the weight is to be added the force of the wind, which has a tendency to increase that effect in a tenfold degree, especially when the inclined position which the masts of most ships are placed, is taken into consideration. If instead of the fid, and the trestle trees having to withstand all this force, the little prop *h* be put into the cavity of the fish, it will be seen that nearly the whole of it, is thereby thrown diagonally upon the lower mast, which is well able to sustain it. Now *it strikes us* that, as the wind has a tendency to bend the lower mast (distinctly considered), in one direction, the strain upon the top-mast at the same time, causes the prop to press in the opposite direction : and supposing these two forces to be equal, the pressure becomes wholly perpendicular, which offers the greatest possible resistance or support to it.

As we intend shortly to notice some improvements by Mr. Rotch in the rigging of ships, in which his patent fids (described in our 39th No. first series), as well as these props are combined, we shall here conclude the subject for the present.

PATENT STONE BRICKS.

To the Editor.

SIR,—I have just obtained the two last volumes of the Register of Arts and Sciences, and in one of them perceive that a Mr. Ellis, of Croxton, has obtained a patent for cutting a certain kind of chalk

stone into bricks. I am a great admirer of *original inventions*, and would wish to draw Mr. Ellis's attention, through the medium of your very useful publication, to the groined arches of the Refectory of Becleigh Abbey, near Maldon, Essex, as he will there see most beautiful *chalk bricks*, cut from solid chalk, and which have stood the test of *six hundred years*.

If Mr. Ellis examines the Patent Office, he will also find that Mr. Dunkin, of Winsley, near Bath, put in a *caveat* for a patent long before his, for bricks cut *by machinery* from Bath stone, which machinery is driven by a steam engine of large power, and is now in full work; and the patent bonds, or stone brick, may now be seen at my wharf—well worthy the attention of the curious in these things, and also of any surveyors or builders who wish to erect a Bath stone front to any edifice at a very trifling expense beyond the best Suffolk white bricks.

I am, Mr. Editor,
Your very humble Servant,
J. W. LEE.

90, Shad Thames, 13th Nov. 1827.

AMERICAN PATENT PIANO FORTE.

By Thomas Loud, jun., of Philadelphia.

[*From the* Franklin Journal.]

To all to whom these presents shall come be it known, that I, Thomas Loud, jun. have invented a new and useful improvement in the horizontal Piano forte, whereby the tone is greatly improved, the instrument is less subject to get out of tune, and the strings are less liable to break; for which invention and improvement I claim a Patent, according to the laws of the United States.

And I, the said Thomas Loud, jun. do hereby declare, that the nature of my said invention and improvement, and the manner in which the same may be carried into effect, are fully made known in the following description or specification.

In the horizontal Piano Fortes heretofore made, that part which is technically denominated the *action* is placed below the strings, and the hammers are made to strike upwards, in a direction contrary to that of the support given to the strings by the bridges. In my improved Piano Fortes, I, in general, intend to place the action above the strings, and to cause the hammer to strike downwards, the strings being supported upon bridges in the ordinary way. Sometimes, however, I intend to place the bridges above the strings, attaching them to sufficient supports of wood, or metal, and to place the action below the string, in the way heretofore practised.

But what I particularly claim as my invention and improvement, is the causing the hammer to strike the strings of horizontal Piano Fortes in such a way, that the direct action of the blow upon the strings, is sustained, and resisted, by the bridges, in consequence of their being situated on the side opposite to the hammers.

Messrs. Loud and Brothers have just completed a Piano Forte, on the plan indicated in their specification, which we have examined, in conjunction with some other persons, well able to judge of the tone, and other qualities of the instrument. It has been a desideratum to give to the horizontal Piano Forte the roundness, firmness, and clearness of tone, which distinguishes the best cabinet instruments: this bell-like, or glassy, effect, is produced in a very high degree by the arrangement adopted by the Messrs. Loud. The action in this Piano is below the strings, as is usual in those of a similar form; but the bridge, or support, is inverted, being placed above the strings: this arrangement possesses the advantage of greater simplicity in the action, than is possible in the other method proposed by the patentees, that is, the placing the action above, and the bridges, or supports, below the strings. We are convinced, however, that in this latter mode, the frequent breaking of the strings will be prevented, and that the instrument will stand much longer in tune than any other of the horizontal kind: our reason for this conviction is, that the effect of the blow of the hammer, in its tendency to break or lengthen the strings, will be counteracted by the supports, or bridges, on their opposite sides. EDITOR.

CAOUTCHOUC PIPES.

THE elastic and durable qualities of Caoutchouc or Indian Rubber have long been known, though till lately, little use has been made of this valuable material. But within these few years Mr. P. Hancock has obtained several patents for various modes of its application, some of which are daily rising into notice, and others need only time to introduce them into general use. The patent caoutchouc pipes are formed of alternate layers of solid or dissolved caoutchouc and canvas, or any other medium, which by a peculiar process forms the whole into a solid and very tough substance.

Pipes are thus made of any bore or strength, (the weakest being capable of bearing a pressure of 600lbs. to the square inch), and in any lengths without a stitch or seam: and they are applicable to almost every purpose for which either leather or metal pipes have been used. For all common purposes, a solution of caoutchouc is used, but for the conveyance of beer, spirits, &c., they are lined with an inner coat of indian rubber, which imparts no taste whatever to the liquors: In this state they are peculiarly adapted for breweries, and for service pipes for public-houses, from their never being subject to leakage; they are much better adapted for the former than leather, and it is well known that in the leaden pipes now used for the conveyance of porter, spirits, &c., from the cocks into the engines, a great oxidation is constantly taking place in the latter, thus mixing a subtle poison with all the liquor that passes through them, which, though imbibed in only small quantities by each customer, has been known in some instances to produce the most deleterious effects. These pipes are also much more convenient than leaden ones, from their perfect pliability enabling them to be thrown aside, or hung up out of

the way even while in use. They are also admirably adapted for water as they do not burst when frozen. For fire hose also the caoutchouc are very superior to leather, as they may be laid by without any attention and are always fit for use, leather ones being almost out of order under such circumstances from the seams giving way, breaking, &c. As syphons, these pipes being both air-tight, and very flexible, they possess great advantages over metal ones, as the pipe being filled with water, the air is of course expelled, and by having a stop cock at the end, it might be carried in any direction; the cock lowered, and turned, the liquid of course runs: so that syphons of any size may be used, the trouble of exhausting them being got rid of. Caoutchouc pipes are well adapted for the conveyance of gas, or steam; for the latter indeed the nonconducting nature of the substance enables the steam to arise at very considerable distances with scarcely any loss of heat. For all the above uses, these pipes have been employed, and as new facts, and new occasions of utility daily develope themselves, as they come to our knowledge we shall have great pleasure in presenting them to the notice of our readers.

METHOD OF BLEACHING SHELL, OR SEED LAC.

It has been a great desideratum among artists to render shell lac colourless, as, with the exception of its dark brown hue, it possesses all the properties essential to a good spirit varnish, in a higher degree than either of the other resins. A premium of a gold medal, or thirty guineas, for "a varnish made from shell, or seed lac equally hard, and as fit for use in the arts, as that at present prepared from the above substances, but deprived of its colouring matter," has long been, and is still offered, by the Society in London, for the Encouragement of Arts, Manufactures, and Commerce. These ends are perfectly attained, by the process given by Dr. Hare, which leaves nothing to desire, excepting on the score of economy. Were the oxymuriate of potash, to be manufactured in the large way, the two processes, that of making the salt, and of bleaching the resin, might be very advantageously combined.

Dissolve, in an iron kettle, one part of pearlash in about eight parts of water; add one part of seed or shell lac, and heat the whole to ebullition. When the lac is dissolved, cool the solution, and impregnate it with chlorine, till the lac is all precipitated.

The precipitate is white, but its colour deepens by washing and consolidation; dissolved in alcohol, lac bleached by the process above-mentioned yields a varnish, which is as free from colour as any copal varnish. R. H.

Chlorine, or oxymuriatic acid, may be formed, by mixing, intimately, eight parts of common salt, and three of the black oxyde of manganese, in powder. This mixture is to be put into a retort; four parts of sulphuric acid, diluted with an equal weight of water, and

afterwards allowed to cool, is to be poured upon the salt and manganese, when the gas will immediately be liberated, and the operation must be quickened, by a moderate heat. If the mixture be made, without the sulphuric acid, and this be added, in small portions, the heat generated by this means will be sufficient to disengage the gas, without the aid of a lamp. A tube leading from the mouth of the retort, must be passed into the resinous solution, when the gas will be absorbed, and the lac precipitated.—*Franklin Journal.*

ON SALT AND FRESH WATER LAKES.

From Dr. Arnott's Second Edition of "*Elements of Physics.*"

There are some lakes on the face of the earth which have no outlet towards the sea,—all the water which falls into them being again removed by evaporation alone—and such lakes are never of fresh water, because every substance, which from the beginning of time rain could dissolve in the regions around them, has necessarily been carried towards them by their feeding streams, and there has remained. The great majority of lakes, however, being basins constantly running over at one part towards the sea, although all originally salt, have in the course of time become fresh, because, their only supply being directly from the clouds, or from rivers and springs fed by the clouds, is fresh, while what runs away from them must always be carrying away with it a proportion of any substance dissolved in them. We thus see how the face of the earth has been gradually washed to a state of purity and freshness, fitting it for the use of man; and why the great ocean necessarily contains in solution all the substances that originally existed near the surface of the earth, which water could dissolve—viz. all saline substances.

The city of Mexico stands in the centre of one of the most magnificent plains on the face of the earth, 7000 feet above the level of the sea, and surrounded by sublime ridges of mountains, many of them snow-capped. One side of the plain is a little lower than the other, and forms the bed of a lake, which is salt, for the reasons just stated; but the lake will not long be salt, for it has now an outlet. About 150 years ago, an extraordinary increase of the lake took place, and covered the pavements of the city; an artificial drain was then cut from the plain of Mexico to the lower country external to it, about sixty miles from the city. This soon freed the city from the water; but by becoming every year deeper, from the wearing effects of the stream, which has never ceased, it is still lowering the surface of the lake, is daily rendering the water less salt, and is converting the vast salt marshes, which formerly surrounded the city, into fresh and fertile fields.

Entomology.

Economy of Spiders.—Spiders are, by the bulk of mankind, regarded only in the light of a pest; but the applications of their webs to the purposes of man are too important to be overlooked. In

astronomical instruments they have been employed with great success, where the accurate measure of a body, or the angle it subtends, is required: for this purpose two of the strong threads of the spider are laid parallel to each other, but capable of being made to approach, or recede from, each other; these being placed on the field bar of a telescope, the object to be measured is brought between the two threads which are adjusted, till it appears exactly to be inclosed; then, by means of a micrometer screw, their distance apart is read off, from which the angle or measure of the object is ascertained.

The process of forming the web of the spider is as follows:—At the lower extremity of the abdomen are situated *five* small orifices, from which exudes the gummy substance that forms the thread: when the animal is desirous to make a *strong* thread, he propels the matter out of all the five orifices, which unite and form one thread; if this be examined under a microscope, it will, however, be found composed of a bundle of five parallel transparent solid sticks, beautifully regular. This thread he sometimes further strengthens by repeating another thread along the other, while newly made. If, on the reverse, the spider is desirous of spinning a fine thread, for the cross meshes, he exudes the gummy matter out of one, two, or three, as he may require, and, by such variations, produces a fabric suited to all his varied purposes. P.

ON THE PREPARATION OF ARTIFICIAL SLATES.

From the Dictionnaire Technologique.

There have been for some years imported into Russia a species of Artificial Slates, manufactured by a person named Alfuid Faxe, of Carlscroon. These substances attracted the notice of several scientific men. M. Géorgi was instructed by the academy of St. Petersburg to make an analysis of them, by which means he discovered their composition. They are a most invaluable substitute for slates; as they are much lighter, impenetrable by water, and incombustible. The following processes for manufacturing them afforded the best results to M. Géorgi.

The substances employed were,—1st, A bolar earth, white, red, or ferruginous, according to circumstances. 2nd, Chalk or carbonate of lime. 3rd, Strong or English glue. 4th, The pulp of paper. 5th. Linseed Oil.

The bolar earth and the carbonate of lime are reduced to powder separately, in a mortar, and passed through a silken sieve.

The glue is dissolved in water, in the usual manner.

The paper pulp employed is such as is known by the paper-makers under the name of common paper pulp, (*papier bulle*). This is steeped in water, and the water afterwards extracted from it by means of a press. Instead of this pulp, we may employ with advantage the waste of white paper, or book-binders' cuttings; these must be boiled for twenty-four hours, and the water squeezed out by means of a press.

The linseed-oil employed must be raw.

The mass of paper being mixed in a mortar, with the dissolved glue, is made into a paste, by adding the bolar earth and carbonate of lime. The whole being well beaten together in the mortar, the linseed-oil is poured in from time to time, as fast as it can imbibe it. They then take a quantity of this mixture, and spread it with a spatula on a plank or board furnished with a ledge or border, to determine the thickness of the layer;—before this is laid on, however, the plank is covered with a leaf of common paper. They then place upon this mixture another leaf of paper, on which they lay another plank, and reverse the whole: they then lift off the bordered plank, together with the first sheet of paper. After this operation, they again reverse the *stone paper*, and lay it upon a plank strewed over with very fine sand by means of a sieve: they then remove the second plank, and the second sheet of paper; leaving the sheet of composition to dry.

These sheets neither crack nor break in drying; but they are liable to become twisted out of shape, and they are seldom smooth, or without lumps on their surface. To remedy these inconveniences, they are passed between the two cylinders of a flatting-mill, which perfectly unites and gives them firmness: they are then submitted for some time to the action of a press, which makes them perfectly straight and even. And, lastly, the two surfaces of each sheet are coated, either with boiled linseed oil, or linseed oil rendered drying by a little oxide of lead.

The following are those compositions which have afforded the best results:—

1st, One part of pulp (made from old paper and book-binders' cuttings), half a part of glue, one part of chalk, two of bolar earth, and one part of linseed oil,—form a thin, hard, and very smooth sheet.

2nd, One part and a half of paper pulp, one of glue, and one of white bolar earth,—produce a sheet, very beautiful, hard, and uniform.

3rd, One part and a half of paper pulp, two of glue, two of white bolar earth, and two of chalk,—produce a uniform sheet, as hard as ivory.

4th, With one part of paper pulp, one of glue, three of white bolar earth, and one of linseed oil, we obtain a beautiful sheet, which has the property of being elastic.

5th, One part of paper pulp, half a part of glue, three parts of white bolar earth, one of chalk, and one and a half of linseed oil,—form a sheet infinitely superior to that obtained by the process N°. 4. This substance has also the property of retaining whatever other shape may be given to it. A few grammes of Prussian blue give it a bluish-green tint.

The various experiments made on these sheets of stone paper, or artificial slates, have proved—1st, That by a continued steeping in cold water for four months successively, they did not in the least change nor increase in weight. 2ndly, That on being exposed to a violent heat for five minutes, they were scarcely altered in form; but were converted into black and very hard plates; they merely appeared

blackened and somewhat scorched. They constructed a house of wood at Carlscroon, which was entirely covered and lined with these articles; they then filled it with combustibles, and set fire to it: the house resisted the action of the flames. The experiment was repeated at Berlin, and with the same success.

The materials fit for making this stone paper are to be found in all parts of the globe. The process is simple, and it requires only very facile manipulations: it may be used, with economy, for covering houses, instead of slates; and for which purpose its lightness renders it far preferable. In this case it is secured, in large leaves, by copper nails, and the joints filled with cement. The whole being coated with an oil colour, forms the lightest covering, and one the least penetrable by water.

The cement which we recommend for filling the joints between these sheets after being nailed on, is composed of linseed oil rendered drying, white lead and chalk, intimately mixed, and used in a nearly fluid state, in order that the composition may the better insinuate itself amongst the joints and interstices, and cover the heads of the nails.

Anatomy.

THE STOMACH OF THE CAMEL—Is found to consist of two cavities, one of which contains the solid food, the other, water in a pure state. Into this second cavity, even when empty, no solid food can pass. The camel therefore, when it drinks, conducts the water in a pure state, into the second cavity, where part of it is retained, while part of it runs over into a cellular structure of the first.—*Ibid.*

LIST OF PATENTS

Expired in December, 1827.

SOWING MACHINE.—To Samuel Tyrrell, of Peddinghoe, Sussex, for a broad-cast sowing machine. Dated December 4, 1813.

MUSICAL INSTRUMENTS.—To John Bateman, of Dyke, York, for an improvement in musical instruments. Dated December 9, 1813.

DYEING.—To Thomas Wright, Great St. Helen's, London, for a composition for dyeing scarlet, and other colours. Dated December 9, 1813.

SPINNING.—To J. S. Rogers, of Chester, for a method of making a certain species of wool into yarn. Dated December 14, 1813.

STEAM ENGINES.—To Joseph White, of Leeds, York, for improvements in steam engines. Dated December 14, 1823.

PURIFYING OIL.—To W. H. Day, of Poplar, Middlesex, for a method of extracting the gross matters from Greenland blubber, and to purify the oil. Dated December 20, 1813.

AXLETREES.—To William Sprately, of the Strand, Middlesex, for an improvement in the axletrees of wheels. Dated December 20, 1813.

SUGAR REFINING.—To John Sutherland, of Liverpool, for various improvements in sugar pans, or boilers, furnaces, &c. Dated December 29, 1813.

LAMPS.—To Sir Thomas (commonly called Lord) Cochrane, Knight, for improvements in lamps with the view of preserving a uniform intensity of light. Dated December 24, 1813.

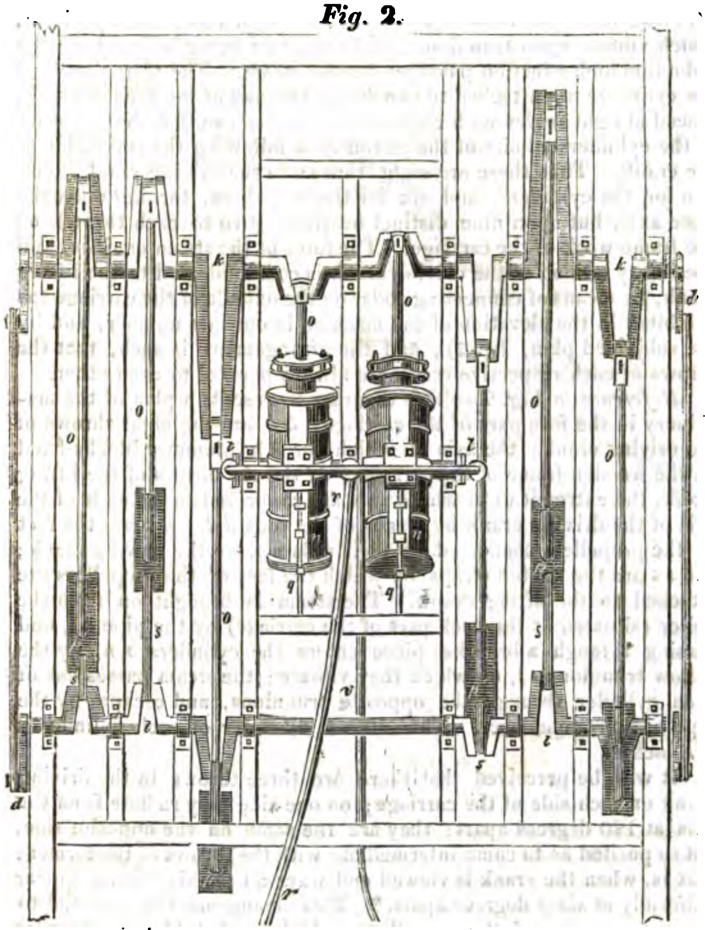
FOWLING PIECES.—To Ralph Sutton, of Birmingham, for a method of preventing the accidental discharge of fire-arms. Dated December 24, 1813.

PRESERVATION OF TIMBER.—To J. C. Murphy, of Edward Street, Cavendish Square, for an [illegible] method for preserving timber from decay. Dated December 24, 1813.

TO OUR READERS AND CORRESPONDENTS.

J. H. B's Machine will not act.—X. Y.—and H. L. in our next.

Fig. 2.



PLAN OF THE PROPELLING MACHINERY

EMPLOYED IN

MR. D. GORDON'S PATENT STEAM CARRIAGE.

In our last number we gave a general description of Mr. Gordon's new steam carriage, with a diagram representing an external side view of it. We now proceed to show by other diagrams the internal arrangements by which the propulsion is effected, and to explain the construction and operation of the several parts: having done which, we shall submit to the consideration of our readers a few observations on the general merits and economy of the machine.

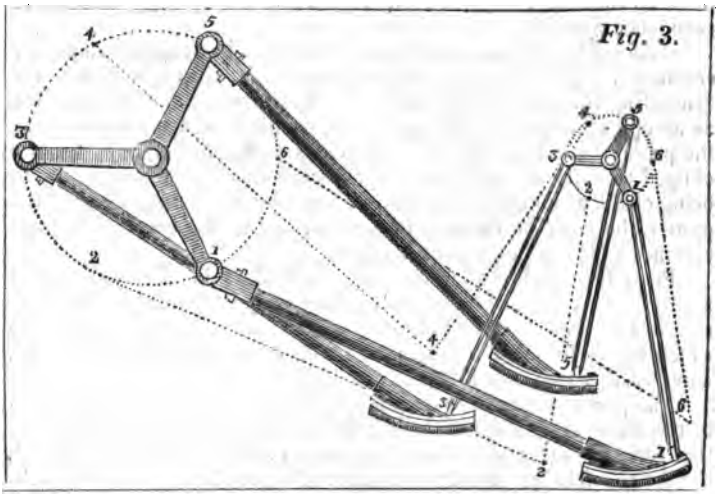
In the fore part of the carriage, and centrically between the driving and lifting cranks of the propellers, are placed the steam

engines; these consist of two brass cylinders, in a horizontal position, which vibrate upon trunnions; and the latter being hollow form the induction and eduction passages for the steam. The piston rods of the cylinders are attached to two distinct throws of the driving crank, placed at right angles with respect to each other, so that the vibration of the cylinders admits of the piston rods following the revolution of the crank. Thus there are eight throws to the driving crank; viz. two for the cylinders, and six for the propellers, turning upon the same axis, but upon nine distinct bearings (two to each throw) on the frame work of the carriage. The force of the steam engines, and the rotary motion of the driving crank is communicated to the lifting crank, by means of connecting rods, on the outside of the carriage (as exhibited in the elevation of the machine in our last number, and by the subjoined plan, fig. 2); and the arrangement is such, that the throws of each respective crank are always parallel to each other.

Reference to Fig. 2.—This diagram represents a plan of the machinery in the fore part of the carriage; *k k* are the eight throws of the driving crank; the axis of which turns in plummer blocks fixed on the wooden frame of the carriage; *l l* the six throws of the lifting crank, the extremities of whose axis are connected to the ends of the axis of the driving crank by means of the rods *d d*. *p p* are the feet of the propellers connected by their rods *o o*, to the driving crank; and *s s* are the double straps by which the feet of the propellers are attached to the lifting crank. The steam is brought on from the boiler (situated at the back part of the carriage) by the pipe *r r*, and passing through a breeches piece enters the cylinders *n n*, by the hollow trunnions *t t*, on which they vibrate: the steam passes out of each cylinder through the opposite trunnions, and escapes by the pipe *v* to the condenser. The external diameter of each cylinder is five inches,

It will be perceived that there are three throws to the driving crank on each side of the carriage; on one side they radiate from the axis at 120 degrees apart; they are the same on the opposite side, but so posited as to come intermediate with the throws of the former; that is, when the crank is viewed end-ways all the six throws appear uniformly at *sixty* degrees apart.* This arrangemant is essential to the proper action of the propellers, which is, that when a propeller on *one* side has been thrust out, another propeller on the opposite side shall succeed its movement, instead of an adjoining one. The action of these propellers is exceedingly beautiful and interesting

* The beautiful *workmanship* of this crank, and *the method of constructing* it, is well deserving the attention of every engineer and mechanic, as it is very different to the laborious process generally adopted, while it is much better. Each arm of the crank is made separately, and with eyes to receive the outer and inner journals; these eyes are chucked in the lathe, and faced to receive the journals, which are also turned in the lathe: the journals being then put into the arms of the crank, they are pinned and rivetted in a very superior manner, forming altogether as fine a specimen of workmanship as we have ever met with. The engineer is Mr. Frasi, of Goswell Street, the execution of whose work is uniformly of the most perfect description.



and it is impossible to conceive a more uniform and perfect movement by simpler means. The annexed diagram, Fig. 3, will afford a clear idea of the action.

The large crank on the left shews at 1, 3, 5, the three throws of the driving crank on one side of the carriage; and the small crank on the right, the same of the lifting crank; the respective throws of each crank are parallel, and they continue so by revolving together; the figures 2, 4, 6, intermediate between the throws of each crank, mark the situation of these throws on the opposite side of the carriage. It will now be seen that the propeller marked 1, is by the position of the crank being just lifted from the ground, while that marked 2 (which is on the opposite side) would, had it been drawn in, be just commencing its operation; then 3 on this side, falls into the position of 2 and 1; then 4 on the other side follows, and in like manner 5 and 6. Thus by the revolution of the cranks, the feet of the propellers are made to describe an ellipsis; they first touch at the heel, and by their curved figure roll round to the toe, (as the carriage is thrust forward) when they are drawn up; although this must be their motion it could not be perceived when a carriage was moved rapidly, they would appear just to touch the ground at considerably greater distances than the actual space between the propellers, owing to the impulse given to the carriage by each successive push.

Though rather out of place we will just mention here, that it has occurred to us, and will probably to many other persons, that if one of these propellers were to be forced against the perpendicular side of some stone, firmly imbedded in the road, a breakage of the propeller must be the result; a little reflection however leads us to think that if the propellers are as strong as their dimensions and construction leads us to suppose they are, the only effect would be to give the car-

riage an increased impetus; and in starting the carriage such a circumstance would be really advantageous.

With a liberality as gratifying as it is unusual among contemporary engineers, Mr. Gordon has adopted one of Mr. Gurney's boilers for generating the steam for the engines. This circumstance has afforded us an opportunity of examining it, and we did intend to describe it in the present number, but the engravings being incomplete, we are obliged to defer the publication for a short time. We are happy in being enabled to do this, because we consider the arrangement of the parts to be much better than those described in the enrolled specification, alluded to in a recent number.

From the small size of the steam cylinders in this carriage, it might be inferred, at first view, that they were inadequate to the work assigned to them. A little reflection however upon the principle on which the motive power is applied in this case, different to all others, may possibly lead to a different conclusion.

The power required to give motion to a carriage is in proportion to the force of gravitation which keeps it at rest. When however that force is overcome, the momentum given would be continued, but for the friction and the resistance of the bodies moved through. This will account for the rapid travelling of our ordinary stage coaches; the momentum having been given, the force requisite to continue their motion is comparatively small.

In Mr. Gordon's locomotive carriage, the impulse is given under similar circumstances, to those of stage coaches drawn by horses, consequently the effect will be the same.

On this account we contemplate an advantage will result from Mr. Gordon's mode of propelling over those in which the power is applied direct to the wheels; a reduction of weight in the prime movers, (the engines and boiler) and, consequently, a great economy in their prime cost, and the subsequent current expence.

In Mr. Gordon's arrangement, it appears to us to be only necessary that the engines shall have sufficient power to *start* the carriage; after the momentum is thus given their full power will not be required, except occasionally in going up hill, or to overcome the resistance of an irregular surface: and it should be borne in mind, that the engines do not (like horses) expend their vigour in keeping up with the accelerated motion of a carriage, required by the momentum or the descent of an inclined plane; but in some measure collect their power, to overcome whatever increased resistance may occur in the road.

In those carriages wherein the power is applied direct to the wheels, the number of strokes of the engines must be uniformly in the relative proportion to the speed of the carriage. For instance, if the pistons are made to travel 220 feet per minute, in order to give a speed to the running wheels of ten miles an hour, these relative *speeds* must be always in the same proportion. Thus causing a greater wear and tear in the machinery, if not a greater expenditure of steam, to which Mr. Gordon's arrangement is not liable.

The propelling of steam carriages up a hill has hitherto been con-

sidered the greatest obstacle to success; on account of the great power necessary to effect it when the force of the engines is applied to turning the wheels; but by Mr. Gordon's application of the power that difficulty is greatly obviated; but little more force will be requisite to propel Mr. Gordon's carriage up hill than on level ground, the only material difference will be in the speed.

FURNACE FOR SMELTING IRON,

By Means of Anthracite.—By Joshua Malin, Engineer.

To the Editor of the Franklin Journal.

Sir,

I have the pleasure of sending you a plan of a furnace for smelting iron ore with anthracite. I have been under the necessity of finishing the drawing rather hastily, but hope, however, that it will be found to be sufficiently descriptive. You will perceive that in its construction it is, in general, similar to the common blast furnace; the crucible and hearth alone differing materially. The crucibles of these furnaces, both American and English, are square; but in this, it is round, and it must necessarily approach this form when anthracite is to be used; this coal is so much more dense than either coke or charcoal, that its weight causes it to descend in the corners or angles of a square hearth, where, being screened from the intense blast which is required, and carrying with it a portion of the unmelted ore, it mixes with, and chills a quantity of the fused ore and metal, and stops the operation of the furnace.

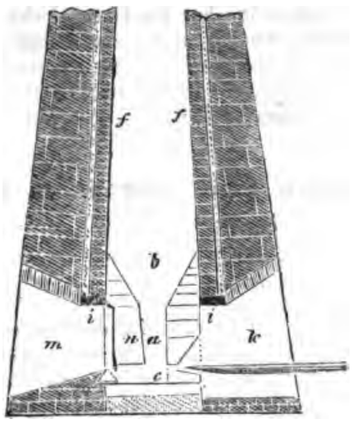
For the smelting by means of anthracite, the blast must be introduced under a pressure of, at least, two and a half pounds to the circular inch; and the quantity required for a common-sized furnace, will not be less than twenty-eight hundred cubic feet per minute; or seven cubic feet per minute for every circular inch in the area of the hearth, at the tuyere. Common-sized hearths are about twenty inches in diameter; $20 \times 20 = 400 \times 7 = 2800$ feet; this, I think, will be found to be a good proportion.

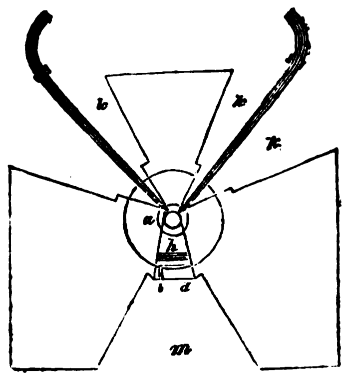
The hearth of the cupola or furnace, in which I tried many of my experiments, was only eleven inches in diameter, at the tuyeres; the blast being introduced as represented in the accompanying plan: I increased the diameter to fourteen inches, and found that the blast which I had at my command, would not enable me to go beyond this point, as, when I attempted it, the scoria, and metal, chilled, and formed a tube from the tuyere, a part of the way across the hearth.

An elliptical hearth will undoubtedly answer, by introducing the blast, with the tuyeres placed opposite to each other, at each end of the oval; I am of opinion, however, that the circular form will be found to be the best.

Lebanon, Pa. May 24th, 1827. JOSHUA MALIN.

The letters of reference exhibit the same parts both in the horizontal and vertical sections, when they are found in both. The figures are drawn to a scale of an eighth of an inch to the foot.





a, the crucible, being a part of what is commonly called the hearth of the furnace.

b, the boshes, or part where the metal passes from the solid to the fluid state, as it descends.

c, the bottom stone of the hearth, bedded on sand, and supporting the crucible, and boshes; these are made of the best stone for standing fire. Whenever the hearth requires to be renewed, this stone, together with those forming the crucible, and boshes, have to be removed, the rest of the stack remaining permanent.

d, the dam-stone, supported on the outside by brick work, on which rests a cast-iron plate, kept covered with coal dust, on which the scoria flows down.

e e, the pipes by which the blast is introduced.

f f, the in-walls of the furnace, made of fire-brick, or of sand-stone, but preferably of the former.

g, a space, from 4 to 6 inches wide, filled with soft sandstone, broken fine, to allow of expansion and contraction.

h, the tymp-plate, of cast iron, to support the tymp stone.

i i, cast-iron lintels, to support the in-walls over the tuyere and tymp arches.

k k, the tuyere arches.

l, the part where the metal flows out.

m, the tymp arch. (This, in Mr. Strickland's Reports, is called the lymp arch, but the common name with us is tymp arch.)

n, the tymp stone, forming a part of the crucible, and supporting a part of the boshes.

IMPROVED POCKET BOOK,

For Engineers, Architects, Manufacturers, Millwrights, and Builders, for the year 1828, containing 435 of the most important Tables and Rules connected with the subjects of Practical Science. By Henry Adcock, Civil Engineer.—*Published by the Author.*

For several years past great pains have been taken to supply the gentleman, and the man of business, with much useful information in a convenient pocket form; while the practical engineer and the operative mechanic, have been left to search for the elements of calculations, and information connected with their respective avocations, through Encyclopædias, Transactions of Learned Societies, and other books, frequently of difficult access, or of laborious reference; or to investigate and determine by experiment for themselves at great expence of time, and with inadequate apparatus, many points which had been previously ascertained by others.

We therefore hail the present production wirh peculiar satisfaction, and are glad that it has fallen into the hands of such an industrious compiler of useful tables and practical rules as Mr. Adcock has shown himself to be by the book before us.

The first part of the work does not differ materially from the commercial annual pocket books which we have been accustomed to see, and find so convenient:—it contains lists of stamp and other duties, bankers, stage coaches, &c.; and 52 pages, divided into spaces corresponding with the days in the year, for memoranda.

The second part, called the *Analysis of Practical Science*, contains arithmetical tables; the definitions, and an extensive collection of useful problems in practical geometry and conic sections, with the mensuration of superficies and solids; illustrated by a great variety of wood-cuts, very beautifully executed.

Then follow tables of the areas of circles, of segments of circles, of circular zones, and the proportions of the lengths of circular arcs; extensive tables of the squares, cubes, the square roots and cube roots of numbers; tables of comparison of British with Foreign weights and measures.

Next, the estimated effects of first movers of machinery, including men, horses, wind, water, and steam, are arranged in tabular forms, showing the different results produced by various first movers, as well as by the same first mover, differently applied.

Mr. Adcock here gives a few rules for determining the effects of the simple machines, called the mechanical powers; and the results of a great number of experiments by Coulomb, and others, on the quantity of power lost by friction; the inertia of bodies; and the rigidity of cordage. Centres of gravity, gyration, percussion, and central forces, are also investigated: and after registering a great variety of useful facts and results connected with hydraulics, pneumatics, the effects of *heat* on bodies (which are well arranged). The work concludes with an extensive collection of highly important tables, rules, and remarks, on the strength, weight, and specific gravity of materials.

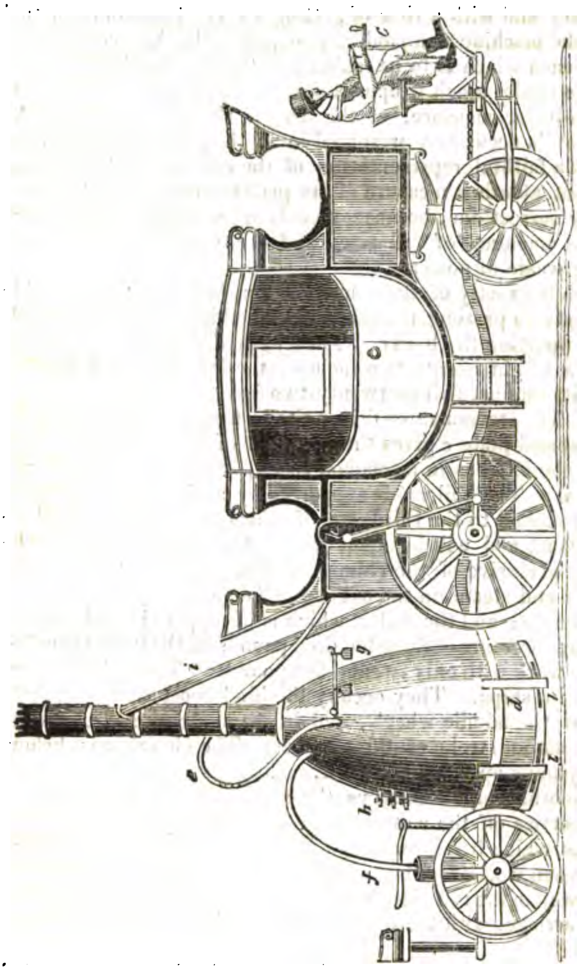
Whether Mr. Adcock has himself supplied much original matter, we are unable, from a very hasty perusal, to say; but that he has shown himself to be a very able and judicious compiler, will be readily admitted by every one, into whose hands this valuable little volume may come.

Though this is the first *pocket book*, it is not the first *book* which treats of the same subjects in a manner somewhat similar, for Brunton in his Compendium of Mechanics, and Gregory in his Mathematics for practical men, have each collected and arranged much matter of great value on the same subjects; but neither of these works are in so portable or convenient a form as the present; and Mr. Adcock has gone much further in the condensation of the useful portion of practical science.

Having thus enumerated the materials of which the volume before us consists, and bestowed upon it what we consider well-merited approbation, we must say we could have wished some little alterations in the arrangement, a few curtailments, and some other matter supplied; for instance, a few pages might have been saved by giving the arithmetical tables only in one way, instead of repeating each table in a different form.

The compendious sketch of vulgar and decimal arithmetic, and some other arithmetical rules, might also we think be omitted without detriment to the work, as persons acquainted with these matters do not require them, and those who are ignorant of these branches of arithmetic would not think of acquiring a knowledge of them through the medium of such a work. By these omissions space might be obtained for a table of logarithms such as Whiting's, without increasing the size of the volume. A table of this kind would be an exceedingly useful addition to many persons.

These points, however, we submit with perfect deference to the consideration of the intelligent author, when he prepares his next edition of it for the press; which we doubt not he will soon have occasion for, on account of the great intrinsic value of the "Improved Pocket Book" *to* "engineers, architects, manufacturers, millwrights, and builders;" for these persons may now carry in their pockets more information of practical utility than is afforded by the generality of private libraries.



a, water cistern; *b*, boiler; *c*, steering wheel, with the conductor; *d*, steel frame which carries the boiler; *e*, the curved steam pipe to supply the engines; *f*, hand pump and pipe to fill the boiler; *g*, safety valve; *h*, notice cocks; *i*, eduction pipe to take the steam from the engine to chimney; *k*, the crank; *l*, pan for the cinders.

BURSTALL AND HILL'S STEAM CARRIAGE.

It would appear by the "SCOTSMAN" that our Caledonian brethren are not behind us in locomotive pursuits. We extract from that paper the following interesting account of some experiments made at Edinburgh, with a large model constructed on Messrs. Burstall and Hill's plans.

"We have the pleasure of laying before our readers this day, a very accurate drawing of Mr. Burstall's steam carriage, which we hope shortly to see travelling in full career upon our roads. Mr. Burstall has made material alterations in his plan since we described his coach

two years ago; and with a view of getting a correct idea of the actual working of the machine at a moderate expense, he has constructed the model coach which is to be exhibited this day in the Waterloo Rooms. The model coach is upon a scale of three inches to the foot, or one-fourth linear measure, of the size of the full machine. As this proportion is accurately preserved in all the parts, the model not only exhibits a faithful representation of the carriage to be used on the roads, but affords a measure of its performance, though not of course a very correct one, because models are scarcely ever so carefully made as machines of full size, and are generally liable to a much greater waste of power.

The coach is exactly of the common form, and carries six inside and twelve outside passengers, but it has an additional pair of wheels behind for supporting the boiler. The length of the model is five and a half feet, its height twenty-two inches; the length of the full-sized coach, with its engine, will be twenty-two feet; its height seven feet four inches. The steersman or driver sits in front, and, by turning a circular horizontal plate *c* gives the first pair of wheels a direction to the right or the left, as in a common coach, when the bends of the road require it. The boiler *b* is supported by an iron frame, extending from the second to the third pair of wheels. It is shaped like a bee-hive or cone, and will be about four and a half feet high in the full machine, exclusive of the chimney. The fire is in the middle, and the water and steam on the outside. The engine is on the high pressure principle; and the boiler, which is of copper, is made strong enough to bear a pressure of three hundred pounds on the inch, though it is intended to work with only twenty-five pounds. Two cylinders are employed, as in ships. They occupy the hind boot, resting exactly on the axle of the middle wheels, and in the model are three inches in diameter, with a stroke of three inches. The cistern *a* is below. The engine pumps up water for itself, which passes from the cistern by a pipe: another pipe *e* conveys the steam to the cylinders; a third pipe *i* carries off the waste steam from the cylinders into the chimney, from which being expanded by the heat, it escapes invisibly. The engine when worked with steam of twenty-five pounds, will be of ten-horse power in the full sized carriage, and the whole weight of the engine and carriage, with the charge of fuel and water, will be about three tons.

We saw the model carriage at work on Saturday last. It travelled round a circle of seventeen feet diameter, on an uneven deal floor, with a speed equal to seven or eight miles an hour. It carried no load, but this was of little consequence, because, in point of fact, the weight of the machine itself, with its fuel and water, is so great, that a full assortment of passengers makes but an inconsiderable addition to it. At the Waterloo Rooms it will be exhibited with a load equivalent to the weight of eighteen passengers. We need not inform persons skilled in mechanics, that the mode adopted of exhibiting its performance necessarily does it injustice; for the loss of power is unavoidably great when a machine like this, with six wheels, travels in a circle, the diameter of which is only three or four times its own length.

Mr. Burstall has avoided one error into which Mr. Gurney seems to us to have fallen. The boiler which forms so great a part of the entire weight is placed near the ground, and the cistern being under the axle of the middle wheels, the centre of gravity of the whole machine is thus kept much lower than in Mr. Gurney's, which must contribute greatly to the stability and safety of the vehicle. The steam coach will travel by stages like the vehicles now in use; she will require to stop about once an hour, to renew her supply of water, and fuel; but a very few minutes will suffice for the operation.

With regard to the danger attending the use of steam coaches, our own impression is, that it will be smaller than what attaches to our present modes of conveyance. If nothing less than a speed of eight or ten miles an hour will serve us, we must be dragged by horses which have a good deal of blood in them; and such horses will now and then have their freaks, and set the skill and prudence of the driver at defiance. But the steam power, if the apparatus is rightly constructed, has no will of its own, but will always be amenable to the hand of the steersman. With proper precautions, the danger of explosion may be entirely obviated. It may either be wholly prevented, or so regulated that if it does occur, it shall operate in a direction which will injure nobody. Steam coaches, when once introduced, will probably have this further advantage, that, upon good roads, the volocity we shall be able to command will have no other limits than such as are prescribed by the danger of the vehicle or machinery flying to pieces. The rate of sailing in steam boats has already been carried beyond what some clever men considered as its natural limits. In calm water twelve miles an hour are now frequently attained in this country. The Americans, who are a nation of travellers, and will have rapid motion at all risks, even go a good deal beyond this. We conversed with a gentleman from the United States a few days ago, who recently arrived here, and he assures us, that the newest steam boats navigating the Hudson, perform the voyage from New York to Albany, 180 miles, in the incredible short period of ten and a half hours. Of about four hundred steam boats plying on the rivers and coasts of the United States, a great majority, probably two-thirds of the whole, have high pressure engines. Yet accidents are rare, and persons of all classes travel in them with confidence.

We de not take upon us to pronounce as to the final success of Messrs. Burstall and Hill's attempt. We have little doubt that a steam coach capable of travelling will soon be constructed, and we think they have as fair a chance to succeed as any of their competitors. But the task of making a machine that shall have sufficient motive power to carry a ton or a ton and a half besides its own weight, and to encounter all the inequalities of declivity and surface occurring in our common roads; that shall also work steadily amidst the incessant shaking and jolting produced by its rapid motion, involves many difficulties for which allowance must be made. Persuaded as we are, however, that these difficulties are superable, we shall not despair of the improvement, though first, and second, and even third trials end in failure. We do not forget that nearly thirty years elapsed between

the building of Mr. Miller's boat and the introduction of steam navigation into common use, during all which time the opinion of superficial observers was, that steam navigation had been brought to the test of experiment, and found impracticable.

In connexion with this subject, we have been favoured with the following communication from Mr. Hill.

To the Editor of the Register of Arts.

Sir,

In answer to your inquiries respecting our progress in the completion of the steam carriage, I can only say, that since you last called on us, I have been making experiments in different kinds of boilers for that purpose, and shall most probably continue in that pursuit through the winter, and in the spring I trust we shall be able to produce a machine, which if not perfect in itself, will at least be a perfect ground-work for further improvements.

You have no doubt seen an account in the public papers, of Mr. Burstall's success in the north with a model, which he has made from my designs and drawings, of a full-sized machine constructed here last summer. It is a perfect copy of the general principles, reduced to quarter the size. The boiler is of a novel construction, entirely of his own invention, and he seems perfectly satisfied that it is calculated to meet every case.

Speaking of his experiments in a late letter, he says, "our circle was the ninetieth of a mile in circumference, which we ran round sometimes at the rate of eight miles an hour. We fixed a deal platform eighteen feet long, rising six inches in the middle, or one in eighteen, which she run up with great ease and rapidity, stopping her on the slope, and starting her on the side of the hill. On the outside of the circle we had a deal bank which rose five in twenty-five in the cross section, to shew how little laying on one side would effect her safety; we run her over tools of all kinds repeatedly, in full speed, and she has actually with the roughest usage, run in eight days full two hundred and fifty miles, without either fresh packing or repair."

For myself I can only add, that until I arrive at the result of my present labours, I can give you no further information, but shall be happy to inform the public through the medium of your work, when that period arrives.

Yours, &c.

I. R. HILL.

Westminster Road, Jan. 5, 1828.

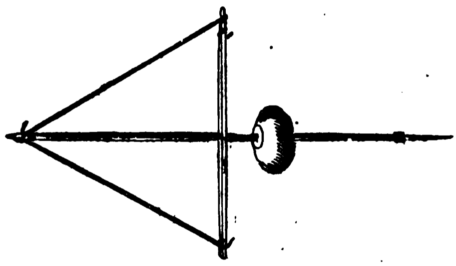
COMPARATIVE VIEW OF

FOREIGN AND BRITISH MACHINERY, AND PROCESSES IN THE ARTS.

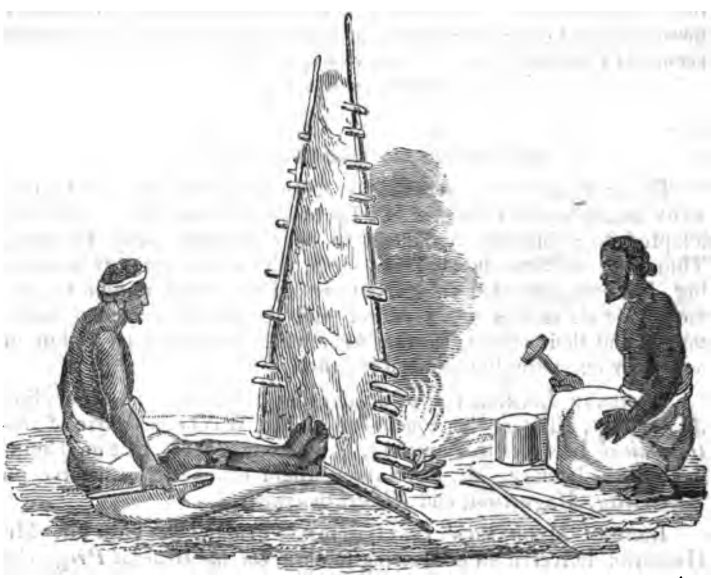
CEYLON. N°. XII.—[Continued from page 268.]

The Singalese blacksmith, in the exercise of his art, is far from unskilful: he is on a par, perhaps, with the common country blacksmith in any part of Europe; and his smithery is almost as well

provided with tools: he does not employ the vice. He uses an instrument for drilling holes in iron and brass, called Tarapane, that answers the purpose extremely well, and is really ingenious.



It is about two feet and a half high; the cord attached to the cross sticks is made of slips of hide twisted. The round weight, to give momentum, (in the instrument examined) was of compact gneiss, neatly cut. Any kind of borer can be fixed to the extremity of the wooden rod. The instrument is worked on the principle of torsion.



No blacksmiths have a greater variety of bellows than the Singalese. Occasionally they use the one already described; occasionally one resembling a common English bellows; and sometimes, as a substitute, a couple of bags made of bullocks' hides, each furnished

with a bamboo nozzle, and a long slit as a mouth, with wooden lips that are opened and drawn up, and shut and pressed down alternately, by the hands of a person sitting between the pair, who keeps up a constant blast by the alternate action of the two. The annexed sketch of two native smiths at work is furnished by Dr. Davy, in his valuable History of the Island.

It would be tedious to enumerate the variety of work a native blacksmith is equal to: locks, and even gun-locks and gun-barrels do not exceed his abilities. The workmanship of them is indeed coarse, and not to be praised; but still they answer pretty well the purpose for which they were intended, and give satisfaction to those unacquainted with better.

The smiths use a composition, as a hone for sharpening knives and cutting instruments, that is worth noticing. It is made of the kapitia resin and of corundum. The corandum in a state of impalpable powder is mixed with the resin, rendered liquid by heat and incorporated. The mixture is poured into a wooden mould, and its surface levelled and smoothed whilst it is still hot; for when cold it is extremely hard. It is much valued by the natives, and preferred by them to the best of our hones.

The method which the Singalese smiths, and indeed people in general, employ to prevent iron tools from rusting, is also not undeserving of notice. They cover them with a thin coating of melted bees-wax, and either bury them, or leave them in the open air, quite secure of their being out of danger of spoiling.

(To be continued.)

SCIENTIFIC INSTITUTIONS.

Royal Institution.—Saturday, 29th December, 1827, Mr. Faraday commenced a course of Six Lectures on *Elementary Chemistry*, adapted to a juvenile audience, to be continued every Tuesday, Thursday, and Saturday. This course, which terminated this morning, has comprehended substances generally; chemical affinity, atmospheric air and its gases, water and its elements, acids, salts, metals and their oxides, earths, &c., which have been treated of in a manner exceedingly clear and instructive.

Western Literary and Scientific Institution.—Thursday, 3d January, 1828, at the conclusion of Mr. Wallis's course of *Astronomical* Lectures this evening, it was announced, that on Thursday, 10th January, Mr. Sturgeon would commence a course on *Electricity, Magnetism*, and *Electro-magnetism*.

London Mechanics' Institution.—Friday, the 28th ult. Mr. Hemming delivered an interesting lecture *On the General Properties of Matter*.

Wednesday, the 2nd January, 1828, Mr. Lingard concluded his lectures *On the Causes of Decay in Timber*.

Friday the 4th, Dr. Birkbeck commenced his course of lectures *On the Functions of the Human Body*.

Wednesday the 9th, Mr. Hodgkin gave his first of a course of lectures *On the Physiology of the Mind.*

City of London Literary and Scientific Institution.—On Wednesday, the 26th December, the members were informed, that on Wednesday, the 2nd January 1828, Mr. A. Barry would deliver the first of a course of Lectures on *Optics.*

London Institution.—Mr. Partington will commence his usual holiday course of Lectures at this Institution next week. The course, will consist of elementary lectures on Natural Philosophy, adapted to juvenile capacities.

MR. TREDGOLD'S OBSERVATIONS

ON THE METALLIC WEDGE PISTONS,

Answered by Mr. Barton, the Patentee.

To the Editor.

Sir,—As Mr. Tredgold has in his excellent work on the Steam Engine just published, treating of the various kinds of pistons, stated that my metallic wedge pistons have a tendency to groove the cylinders in which they work, I beg leave to state, without fear of contradiction, that such an effect has never been produced by any pistons made by me; but, on the contrary, that they have a tendency *to improve* the cylinders. Instances may, however, have occurred, where injury has been done to cylinders by *imperfect imitations* of my patent. In all those cases where I have put them into cylinders, the parties will testify that no such effects as stated by Mr. Tredgold have taken place; and I have very numerous certificates, (which you, Mr. Editor, have seen), from the most respectable establishments, of the great advantages derived from their introduction. Mr. Tredgold suggests in his work, like many other theorists, an *improvement* upon my pistons; but I can tell that gentleman, that this *improvement of his was tried by me many years ago*, in his Majesty's Dock Yard at Portsmouth, to a thirty horse engine, *at the desire of the officers of that establishment*, and was found not to answer; but to produce those very effects which Mr. Tredgold proposes to avoid, and which, I repeat, never were produced by any piston made by me, according to my own plan; and I challenge Mr. Tredgold to prove the contrary. As the observations of such an eminent writer as Mr. Tredgold is, must have considerable weight with the public, I trust he will point out the instances where injury has been done to the cylinders in the way he describes. I am, Sir, Your obedient servant,

John Barton.

38, Seward Street, Goswell Street, 7th January, 1828.

NO PARADOX IN PNEUMATICS.

In answer to J. M.'s query in our 17th N°. p. 272, we would state that the reason of a vessel being exhausted of air with *less force* and in *less time*, by a double-barrelled air-pump than by a single-

barrelled one, is—that in working with a single barrel a portion of power is *lost* in each stroke of the piston, equal to the difference between the pressure of the atmosphere and the resistance of the air remaining in the barrel when the piston begins to descend, and decreasing till the density becomes the same on both sides of the piston; and not that any power is *gained* by the double-barrelled pump to controvert the *dogma*, that "what is gained in power is lost in time." In other words, the force of the atmosphere which is lost in pressing down the piston after every stroke of a single-barrelled air-pump, is, by the connection of the piston rods, made available to assist in raising the ascending piston in the second barrel of a double-barrelled pump.

Improvements in Steam Engines.

According to the valuable records kept of the duty of Steam-engines, at the mines in Cornwall, a most important improvement has been effected in two instances, of engines erected by Captain Samuel Grose, dependent entirely upon attention to the smaller details of the machines. The best engines, heretofore, had not done more than raised forty millions of pounds of water one foot high, by each bushed of coals consumed, except, indeed, upon short occasions. In one of the cases in question, at Weal Hope, of sixty-inch cylinder, working single, as usual, the duty rose to fifty, fifty-four, and fifty-five millions of pounds; and in the other engine of eighty inch cylinder, at Weal Town, the duty rose to fifty, fifty-four, and fifty-five millions of pounds; and in the other, an engine of eighty-eight inch cylinder, at Wheal Town, the duty rose in

April	61,877,545
May	60,632,179
June	61,762,210
July	62,220,820
August	61,764,166

thus exceeding by nearly fifty per cent. what had been effected before that time.

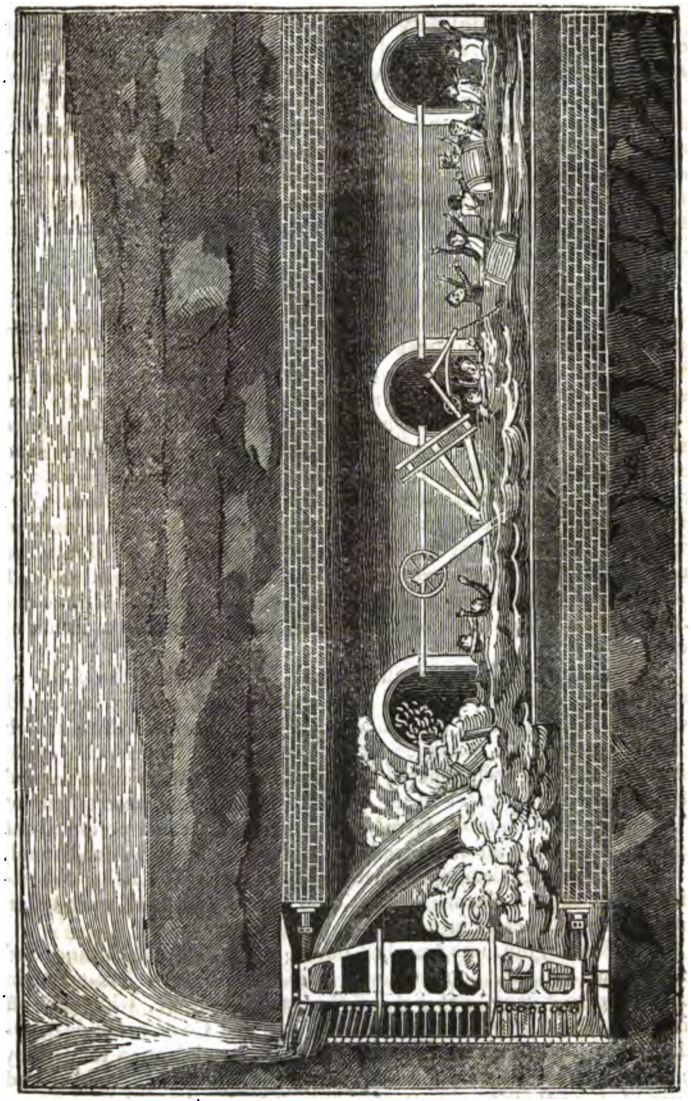
Horticulture.

Vegetable Life.—A rather uncommon instance of the tenacity of life in the vegetable kingdom occurred some time since in the royal park at Bushey. Some small portion of it was broken up for the purpose of ornamental culture, when immediately several flowers sprang up of the kinds which are ordinarily cultivated in gardens. This led to an investigation, and it was ascertained that this identical spot had been used as a garden not later than the time of Oliver Cromwell, more than 150 years before.

TO OUR READERS AND CORRESPONDENTS.

W. W's. communication has been received, but it is unfit for our pages, as we are not a medium for *advertising*, but to describe what has been done. He had better consult somebody who might have an interest in assisting him to bring his invention forward; and when he may be ready to *describe*, our columns shall be open to him.

C. H.—X. Y. and W. H. in our next.



RECENT DISASTER AT THE THAMES TUNNEL.

RECENT DISASTER AT THE THAMES TUNNEL.

We have the painful duty of recording in our present number an account of a second irruption of the water into the great Tunnel now forming under the bed of the river Thames, which has been attended with the lamentable loss of the lives of six of the workmen; three of whom have left widows, one of them two children, and another six orphans. This calamity we deplore the more, because we feel assured that it might easily have been prevented by the exercise of a little ordinary prudence and precaution. The following account of the occurrence, extracted from the newspapers, embraces, we believe, all the leading facts.

At six o'clock on Saturday morning, the night "gang" left their work, and were succeeded by the day men, consisting of 130 excavators. Mr. Brunel, jun., was at box No. 1, in which two workmen, named Ball and Collins, were employed, and he remarked that the water drained through the soil at the shield much more rapidly than it had done for some time. The soil appeared, which for some days had been strong and clayey, much looser, the water and sand poured through the left of the box, but not in such quantities as to create a supposition that the evil could not be soon remedied. Mr. Brunel, jun., at about half an hour past six o'clock, was standing in box No. 1, when several hundred weight of mud was forced into the tunnel through the left corner of No. 1 shield. The boxes No. 1 and 2, which had been in a very precarious state, had yielded to the pressure of the high tides of the season, and permitted the influx of the river.

The water rushed with such extreme velocity, that the force of the air threw one man upon his back on the stage, and extinguished the gas. It is difficult to describe the agitation and alarm which prevailed among the workmen at this moment. Those who could get to the eastern arch effected their escape, and others were carried by the force of the water to the end of the shaft, and were taken out of the water in a state of extreme exhaustion. At one period about eighteen men were all immersed in the water, besides Mr. Brunel, jun.; and that gentleman and twelve of the men, after being repeatedly driven against the wood work, and severely bruised, were taken out of the shaft nearly insensible.

Mr. Brunel, jun. was knocked down, with Ball and Collins, and at the same instant, Jeptha Cook, who was a bottom box-man, in attempting to escape, got behind the rush of water, which cut off his retreat, and he perished. Ball, Collins, and Cook, were destroyed almost instantaneously. The rush was so violent as to destroy the lower part of the staircase by which the labourers ascended and descended, so that it was utterly impossible for them, by any exertion, to save themselves. Three other men have also perished. George Evans, J. Long, and W. Seton, who were at work at the lower boxes of the frame where the catastrophe happened.

In our former notices of this magnificent and unfortunate public

work, we omitted to give a longitudinal section of it; we now supply that deficiency; and have attempted to give a representation, at the same time, of the nature of the catastrophe, as related by Mr. Brunel, jun. in the following letter addressed by him to the Directors of the Tunnel Company, on the morning of its occurrence.

"Saturday Morning, Jan. 12.

"I had been in the frames (shield) with the workmen throughout the whole night, having taken my station there at ten o'clock. During the workings, through the night, no symptoms of insecurity appeared. At six this morning (the usual time for shifting the men), a fresh set, or shift of men, came on to work. We began to work the ground at the west top corner of the frame. The tide had just then began to flow, and finding the ground tolerably quiet, we proceeded by beginning at the top, and had worked about a foot downwards, when, on exposing the next six inches, the ground swelled suddenly, and a large quantity burst through the opening thus made. This was followed instantly by a large body of water. The rush was so violent, as to force the man, on the spot where the burst took place, out of the frame (or cell), on to the timber stage, behind the frames. I was in the frame with the man, but upon the rush of the water, I went into the next box (or cell), in order to command a better view of the irruption; and seeing that there was no possibility of their opposing the water, I ordered all the men in the frames to retire. All were retiring, except the three men who were with me, and they retreated with me. I did not leave the stage until these three men were down the ladder of the frames, when they and I proceeded about twenty feet along the west arch of the Tunnel. At this moment, the agitation of the air by the rush of the water was such as to extinguish all the lights, and the water had gained the height of the middle of our waists. I was at that moment giving directions to the three men, in what manner they ought to proceed, in the dark, to effect their escape, when they and I were knocked down and covered by a part of the timber stage. I struggled under water for some time, and at length extricated myself from the stage, and by swimming, and being forced by the water, I gained the eastern arch, where I got a better footing, and was enabled, by laying hold of the railway rope, to pause a little, in the hope of encouraging the men who had been knocked down at the same time with myself. This I endeavoured to do by calling to them. Before I reached the shaft, the water had risen so rapidly, that I was out of my depth, and, therefore, swam to the visitors' stairs, the stairs for the workmen being occupied by those who had so far escaped. My knee was so injured by the timber stage, that I could scarcely swim, or get up the stairs; but the rush of the water carried me up the shaft. The three men who had been knocked down with me, were unable to extricate themselves, and, I am grieved to say, they are lost, and, I believe, also two old men and one young man in other parts of the work."

(ADDITIONAL PARTICULARS.)

The noise created by the influx of the water was tremendous, and absolutely deafened the ears of those engaged at the bottom of the shaft; indeed, it was so powerful, that the water rose several inches above its level in the shaft. As soon as the alarm had reached the outside of the shaft, the tidings were immediately communicated to the Tunnel Office, and in a few minutes they were known throughout Rotherhithe. The consternation which prevailed amongst the wives and children of the workmen, and their anxiety to see their husbands and parents, was most afflicting.

In the midst of this distressing scene, out rushed a number of men in a state of great exhaustion, some carrying their fainting comrades, who were removed to the house of Mr. Timothy, the Spread Eagle, where they were brought to by restoratives. Mr. Brunel, jun. was brought out with his ancle much injured, in his exertions to save the unfortunate men that have perished.

A meeting of the Directors of the Tunnel Company took place, which was attended by the Messrs. Brunel, who reported the extent of the mischief, and the time and expense which would be incurred in remedying the same. Mr. Brunel speaks confidently that he shall be able to overcome the accumulated difficulties which have presented themselves during the progress of the work; and though this event will retard its completion, he has no doubt of ultimate success.

It is *stated* in the Morning Herald, that "after the first breach of the Tunnel, Mr. Brunel received no less than 260 written plans, together with verbal communications, making altogether 400 proposed remedies for the disaster. Several of them displayed much talent, but the great majority differed only in degrees of absurdity." This paper then proceeds to state several silly schemes that were among "the 400 remedies," and afterwards mentions the following proposition as being the best of all.—"One of the best plans (Mr. Brunel some days ago declared) was sent to him by a poor *cobbler*, who, for want of any thing better, closed the letter containing its description with *cobblers' wax*. This plan was to protect the work by means of a sort of bell, large enough to cover the orifice in the Tunnel. This bell to be lowered down, and, when fixed to its proper place, the water was to be pumped out. It would then be kept down by the weight of the superincumbent fluid, and form an arch, under which the work might be carried on securely. As the work advanced the bell might be shifted to protect it. The *only* objection which occurred to Mr. Brunel against this plan was, that *the ingenious author had not been aware of the great inequalities of the surface of the ground at the bottom of the river*. Had the surface been so perfectly level as it was presumed to be, the plan would have been practicable; but the experience derived from the use of the wooden frame, tried in the first instance, proved that it was inapplicable." If the term *bell* is meant to convey the idea of a diving bell of the *ordinary* construction, it must needs be, to protect the work, no less than fifty feet in diameter; consequently would weigh several thousand tons, and require a whole fleet of Indiamen to weigh it; but the idea

is in other respects equally preposterous to be for a moment entertained. Under this mistaken view of a bell, we have no doubt that the admirable contrivance of Mr. Maurice Garvey, described in N°. 103 of our first series, is alluded to: this ingenious man is an active and useful member of the Committee of the London Mechanics' Institution, and is by profession (not a "poor cobbler," but) a clever and intelligent *modeller*; and we think it a very probable circumstance that his letter was sealed with the *wax* that he uses in his business, "for want of any thing better."

Now, so far from the ingenious author not being aware of the probable inequalities of the surface of the ground at the bottom of the river, it will be seen by what follows that the contrivance *was, by anticipation, adapted to ordinary inequalities*, and that Mr. Garvey had likewise made provision to meet the case, should there be *extraordinary* inequalities of surface.

As many of our present readers may not have read the first series of this work, and as Mr. Garvey's plan inserted therein, is of real importance at the present crisis of the undertaking, we make no apology for the re-introduction of the subject in this place.

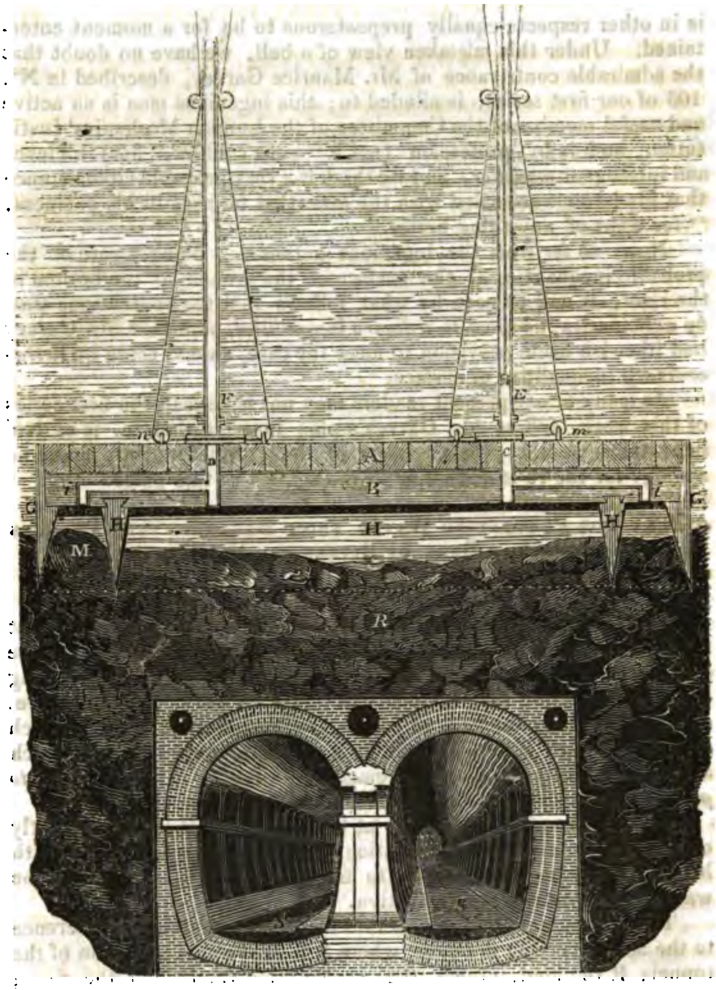
A Plan for Preventing Water from Breaking into Tunnels under the Beds of Rivers, by Mr. Garvey.

To the Editor.

Sir,—While reading in the public prints of last week an account of an accident occurring at the Tunnel now in progress under the Thames at Rotherhithe, by the water breaking into it, the following plan of preventing such accidents in future to works of that nature, carrying on under the beds of rivers, suggested itself to me, which might be carried into operation at a moderate expense, and which appears perfectly adequate to remedy the present difficulty, *and to prevent the occurrence of such accidents in all similar cases.*

The plan consists in placing at the bottom of the river, directly over the part undergoing excavation, a large platform or raft, with ledges proceeding downwards to fix into the soil, to prevent the water from entering the excavation.

The nature and operation of this will be understood by reference to the accompanying drawing, where S S represents a section of the tunnel; R the mud, gravel, &c. constituting the bed of the river; A B the square platform, about twice the width of the tunnel, consisting of two layers of planks crossing each other at right angles, and made water and air-tight by a stratum of artificial leather, tarpaulin, or other elastic water-proof material, between the layers; G G and H H represent sections of the ledges or rims, which may be made of iron, or wood pointed with iron, the platform must be loaded sufficiently to sink in water; F is a pipe for the escape of the air while the platform is descending in the water; and E is a pump to draw off the water from under it when it reaches the bottom; *v v* are sliding valves, to be opened or shut at pleasure by the cords passing over the pulleys *m m* and *n n*; the bent pipes *i i* are for the escape



of the air or water from the space between the ledges G and H. When the apparatus is put down to the bottom of the river, the water is to be removed from underneath by the pump E, which will produce a very great hydrostatic and pneumatic pressure on its surface, and cause the points of the ledges, G and H, to penetrate the bed of the river, and the whole to become firmly fixed in its place. The cavity M, which extends of course all round the raft, is made conical, for the purpose of compressing the soil between the rims as they are forced down, and thus *preventing the entrance of the water at the edges.*

When the apparatus is to be moved forward to a new station, the pump E is to be converted into a condensing air pump by changing the valves; and air is to be forced under the raft till it is disengaged from the bottom, *when it can with facility be moved forward in the water, and sunk as before.*

When the bed of the river is *very* irregular and gravelly, it may be necessary to dredge it, and put down clay in some parts before the platform is brought to its place.

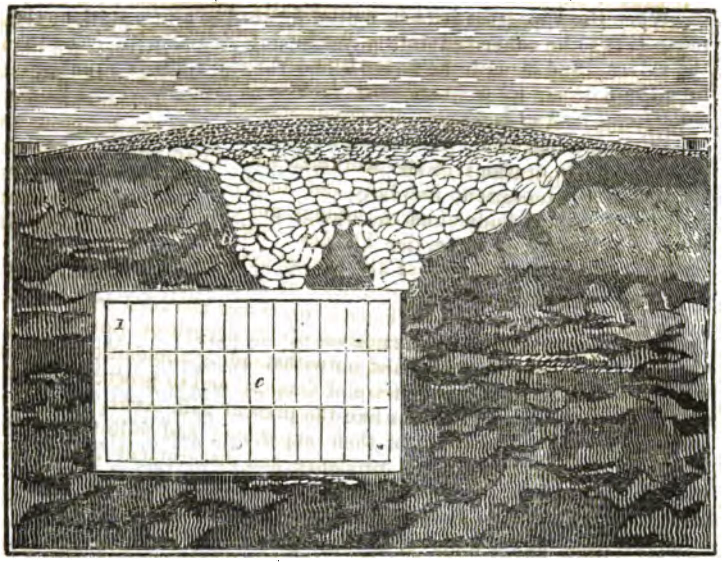
Should you consider this worthy a place in your truly useful work, it is much at your service.

32, Ogle Street, I am, Sir, your obedient Servant,
20th May, 1827. MAURICE GARVEY.

Having described that which is stated to have been the best of the rejected plans, (as acknowledged by Mr. Brunel to Mr. Garvey,) we shall proceed to notice that which was adopted, or put into execution, in preference. The concavity in the bed of the river, and the hole through which the water rushed into the tunnel on the 18th of May was first filled with clay, bags of clay, and gravel; a large flat wooden raft *(without ledges)* was then sunk over the new-made ground, to prevent any sudden displacement of it, and by that means afford a full protection to the workmen when they might recommence excavating *underneath.* The water, however, found its way under the raft, and the powerful engine and pumps were employed for a considerable period without lowering the level of it in the tunnel. The works were about half emptied of the water, when the force of the tide raised up one side of the raft, threw off the weights which had kept it down, when it floated up to the surface of the river. The ground in another part, contiguous to the former hole, now gave way, and the tunnel was again filled with water. Fresh quantities of clay and bags of clay were then employed to fill up the second hole, and the enlarged dimensions of the former, occasioned by a settling or movement of the artificial ground, was also filled up to a level with the natural bed of the river. The clay was covered with a stratum of gravel, and this by a large and very thick tarpauling, which was kept down by cast-iron kintledge; another layer of gravel was then thrown over the whole to keep it as closely together as possible. The following diagram will afford a clear comprehension of it.

At *b* was the hole, through which the first irruption took place, and *a* the cavity produced by the second influx of the waters, divided only by a comparatively small bank of earth: at *c* is the shield, having 36 compartments; and that marked by figure 1 is where the present disastrous accident took place: *d* is the tarpauling kept down by cast iron kintledge, above it is a stratum of gravel, and under it another stratum of gravel, and the bags of clay,

Although this plan has proved an effectual remedy as far as it has extended, the repetition of such remedies, (whenever quicksands may be met with, or irruptions formed in the future progress of the work) must be attended with an expense that cannot possibly be supported. We therefore regret exceedingly that Mr. Garvey's plan was not



adopted, as it is admirably calculated to prevent the recurrence of such accidents; it can be shifted with great facility from place to place, affording constant and certain protection to the workmen, and security to the work throughout; and at an expense considerably less than that which has already been incurred.

Arrangements have already been made to fill up the aperture; Mr. Brunel has been repeatedly down to examine the nature of it; large quantities of bags of clay have been thrown in, and a great number of barges are employed in prosecuting this work. In addition to separate bags of clay, bundles of them are connected together, and in that state lowered into the hole, through an opening made in a raft, moored over the spot for that purpose.

A letter from one of the assistant engineers employed at the Tunnel has been inserted in the Times (16th inst.) in which the writer claims a reliance upon his statement, from his having "attained his *scientific* acquirements under the celebrated Dr. Hatton, and Professor Dalby." Our limits do not permit us to insert the whole of this letter, we shall therefore only make one extract, and leave the reader to form his own conclusions of the scientific knowledge displayed, and how far it is consistent with the candid statements of his colleague Mr. Brunel, Jun.

"It appeared, from the situation in which I stood, by the shield, on Friday evening last, that the soil then under operation (as selected from the hands of the poor fellows who are in all probability now no more) consisted of blue clay, possessing an infinite combination of shells, mixed earth, and particles of rock; and it would appear that in the excavation of the latter, the accident must have originated, for

it usually happens that when rocky substances are hewn out of their places, their cavities are not unfrequently superseded by a body of quicksand and other penetrating matter; and these again, by having a communication with the water from the bed of the river, are naturally succeeded by it: hence may be traced the source of the present incursion. And moreover, the circumstances of jarring and knocking an immense machine, (for such the shield is), after the numerous and repeated applications of the workmen with their tools, in the due process of excavation, are fully and amply sufficient to loosen and bring down any body of earth, though not oppressed with a tremendous weighty fluid, like the Thames. Of course high winds and accumulated floods increase the hazard and burden upon the cavern. I have frequently had opportunities of observing in this, as well as in other countries, that workmen in processes attended with any risk, do not sufficiently avail themselves of the securities provided by an engineer for their safety; and notwithstanding admonitions are daily and hourly bestowed to beware of danger, and to proceed with care and attention, still chances like the present will occur, from disregarding the suggestions of their superiors; and unless a superintendent could delegate his prudence and discernment into as many places as there are assistants and labourers in effective operation, accidents will happen, and no human foresight can avert them. Consternation and a want of energy generally assail a miner, when proceeding rapidly or slovenly with his work, should any danger suddenly present itself; and unless his faculties are quite alive to detect the fluid at the moment it attempts to break in, which the apertures in the shield would very well enable even a feeble person to control, painful to relate, such moment of security is allowed to escape, and in rushes the torrent, *attracted by the air,* with all its baneful consequences; at first immerging through a small recess, and directly enlarging with such suprising rapidity, that no living force, however numerical, can withstand its absolute sway and drowning violence."

PROPOSED FLOOD-GATES FOR THE THAMES TUNNEL.

To the Editor of the Register of Arts.

London, 13th Jan. 1828.

Sir,—The lamentable accident which occurred yesterday morning at the Thames Tunnel, has suggested to me the importance of introducing a few yards behind the workmen, floodgates so constructed that the lower parts of the gates will be first shut by the water issuing in at the place where the work is carried on, and when the waters rise nearly half way up, then to shut the middle parts of the gates, and when it rises near to the top to shut the top parts of the gates. This arrangement would afford all the workmen time who could reach so far as the floodgates to get safe out and prevent the Tunnel from being filled with water. This plan would not only tend to obviate much of the danger to be apprehended by the workmen, but

greatly diminish the enormous expense consequent from such an accident. The small space between the shield and the floodgates would soon become filled with mud and sand, and the bed of the river might then be soon made good from above, as there would be no liability of the materials put down for that purpose being loosened, and removed, by the periodical ingress and egress of the water during the rise and fall of the tide.

I have no doubt but that the best method of carrying this plan into effect, will really suggest itself to the intelligent engineers connected with this great and arduous undertaking; however, if you should consider the details of the scheme worthy of a place in your useful journal, I will readily furnish you with a drawing and description of it in a few days. X. Y.

From the magnitude of the undertaking, and the importance of protecting the lives of the workmen employed, we take the liveliest interest in the proposition of X. Y. and shall consider ourselves greatly obliged to him for the drawing and details offered.—Editor.

Fig. 1.

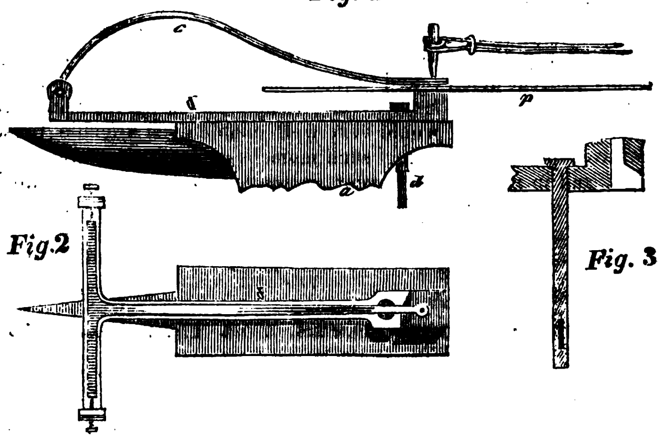


Fig. 2 *Fig.* 3

PUNCHING BOILER PLATE IRON.

To the Editor of the Register of Arts.

Sir,—As your publication is a vehicle of information to the public, and particularly the working classes, to whose conveniences and advancement in the arts of life it seems to be solely directed, I beg to present you with a drawing of an instrument which I have found extremely useful in punching rivet holes in boiler plates, not having the power of a steam engine and a punching machine of the ordinary kind, which of course is superior; but I doubt not some of your numerous readers may occasionally have little jobs in this way, without

possessing the conveniences of a boiler manufactory, I would recommend such persons to make the above article, they would find it much more accurate and much easier kept in repair, than any of the common make-shift methods I have ever before seen adopted.

Fig. 1 shows a side view of the machine fastened on an anvil *a*, by a cutter bolt *b*. Fig. 2 a bird's-eye view of the same. Fig. 3 a section of punching hole, showing a part cut out for the pieces to fall out.

p p is a plate to be punched; the back end of the lower part *b* is furnished with a T piece, each end of which is turned up and tapped for the reception of a centre screw. On these centre screws hangs the guide arm *c*, which is also T shaped: the other end of this guide arm has a hole *c* just the size of the point of the punch to be used: in order to bring this hole to coincide with the lower one, it is only necessary to lengthen or shorten the arm, by bending it a little more or less, and turning the screws a little either way, which must be granted, is much easier than adjusting a punch sliding in square holes, guides, &c. The set screws are also furnished with a nut each to set them fast when adjusted. My reason for making it so long is, that any width of plate may come inside the holes; and even I have sometimes found it necessary to punch holes when plates have been rivetted together. It is scarcely necessary to add that a common rod punch is used with its point only filed up to fit the hole.

Should you consider the above worth insertion, I shall be glad to hear that any one has found the convenience in it that I have.

I am, yours, &c.

Westminster Road. J. R. HILL.

ESSAYS ON LITHOGRAPHY.

No. I.

INQUIRIES have frequently been made of us respecting various individual processes in lithography; and as this beautiful and useful art is, independently of those inquiries, of the highest interest to every person of the least taste or genius, we gladly avail ourselves of an opportunity afforded to us, of supplying our readers generally with a series of excellent essays on the subject, which embrace all the essential information that has hitherto been published. They are derived from the "*Journal des Connoissances Usuelles,*" published at Paris, by Count M. C. de Lasteyrie, (son-in-law to Lafayette,) who has an extensive lithographic establishment in that city: they are translated from the French, by Dr. Jones, the learned editor of the Franklin Journal, from whence we extract them. The instructions given will be found to be strictly practical. The separate branches of the art will be divided into distinct papers: one of which will be given in each succeeding number of this work, and will extend to seven or eight in all. The present relates to

The Stones used in Lithography.

It is necessary to remark, that a lithographic establishment should be provided with stones of all dimensions, in order to enable it to execute work of all kinds. To the amateur, who has only one particular design, and who is satisfied with the lever press, of which we have given a description,* only a small number of stones is necessary. Two or three may suffice for him, who confines himself to experiments, or to one particular subject.

The country adjacent to that wherein lithography originated, is found abundantly provided with stones, suited to this art. There are immense quarries of it disposed in layers, along the Danube, in the country of Pappenheim, and in several other spots. The principal quarries wrought, are at a village called Solenhofen. Every one admitting the existence of a first cause, must believe, that Providence, who destined to this age the invention of an art favourable to the progress of civilization, had formed a considerable mass of stones, ready prepared for the service of lithography. They are in fact, found disposed in layers of one, two, three or more inches in thickness, in such a manner that it is merely necessary to cut them into convenient sizes, and to raise them from the quarries; their thickness being equal in all their strata. Nature, which knows neither privilege, or monopoly, has distributed the same benefit amongst other countries, though in a way less striking. Lithographic stones are found in France, Italy, Prussia, Spain, and in the United States. Researches made with greater care, would undoubtedly discover them in a greater number of places. France might do very well without stones from Solenhofen. The quarries discovered in the departments of the Indre, and in that of the Ain, and even in some other places, are sufficient for our necessities. All the lithographers of Paris make use, however, almost exclusively of those from Germany. The reason of this, is, that our quarries have been badly worked, either from want of funds, or from ignorance. The first masses which presented themselves, on the superficial strata, have been employed; these stones have been full of hollows, of veins, or other defects, though otherwise of a good quality: being harder than those of Solenhofen they are excellent for writings, for drawings in ink, and for line engravings. Those of the first quality, from Germany, are preferred for designs in crayon; those found in commerce, are not all equally good. The following are the properties which denote the goodness of a lithographic stone.

White stones are generally inferior to the other kinds, being less durable. Those of a yellowish, or rather a greyish tint, are to be preferred, on account of their durability, and because their grain is, generally, most equal. Those which are covered with points, or little whitish parts, resembling vermicelli, ought to be altogether rejected, especially when it is necessary to make delicate drawings in crayons; as the marblings, or shades of different colours, deceive the eye of the artist, and prevent his giving to his work, that effect and

* Of this a drawing and description will be hereafter given.

harmony, which it ought to have. The strata with stripes of a more transparent tint than the general mass of the stone, ought to be rejected, not only because they are liable to split, but because they more readily take the ink in those parts, and leave the traces of it more strong upon the designs. Stones, however, are met with, which have fine lines, or threads of a brownish hue, which do not present any impediment to the success of the artist.

Stones which are hard, and homogeneous, acquire a more equal surface, and are better adapted to the harmony of the tints; they give a greater number of impressions, without clogging, and furnish proofs more clear and more brilliant; whilst the contrary is the case with those which are softer: the durability of a stone may be ascertained by scratching it with the point of a knife. Those which are soft retain with more difficulty the traces of the design in the light touches: they clog more readily, and, consequently, afford a smaller number of impressions. The metallic pen cuts them easily, which produces a clogging, and prevents the ink from flowing. The grain of these stones is always coarse and unequal. Those which have holes, or those which are unequal in their grain, or in their hardness, present the same inconveniences; they check the pen on the point, when employed in imitating line engraving, and do not admit of the artist giving clearness and neatness to his work. The soft parts being more easily acted on by the acid, are corroded, and injure the parts of the design with which they have been covered. Stones which have any defect whatever, ought never to be used for the crayon, with which it is necessary to draw with particular care; they are generally used for works in ink. The thickness of stones is immaterial, provided they are not too thin; for in this case, there is a risk of breaking them in the operation of printing. Their thickness ought to be proportioned to their surface. The smallest should not be less than about an inch; when thicker, they have the advantage of serving for a considerable number of designs, but they are very inconvenient when it is desired to remove or to export them. It sometimes happens, that a stone, the surface of which presents all the qualities which have just been spoken of, and which has succeeded well in the impression of one or more copies, is found to be bad in the succeeding impressions.

The stones proper for lithography are composed of lime, of argil, and of silex. The first of these substances predominates, the third is found in very small quantities. A stone entirely calcareous, does not answer for lithography, as has been proved by the marble of Carrara; crayon and ink adhere to this stone with difficulty, and are readily effaced from it; the lines and the shades in a great measure disappear. One of the most certain indications of lithographical properties, is the conchoidal fracture, or that kind of form presented by the fractures of the stone, when broken by the blow of a hammer, which resembles that of a shell. All stones of this kind will be found good, if they are also hard, have all the fineness of grain, and homogeneousness of texture which are necessary.

(To be continued.)

COMPARATIVE VIEW OF

FOREIGN AND BRITISH MACHINERY, AND PROCESSES IN THE ARTS.

CEYLON. N°. XIII.—[Continued from page 302.]

THE following is an *Analysis of the Singalese Iron-stone and Lime-stone, by G. Middleton, Esq.* Apothecary to the forces at Colombo. Extracted from a communication of SIR JAMES M'GREGOR'S to the *Edin. New Phil. Journal.*

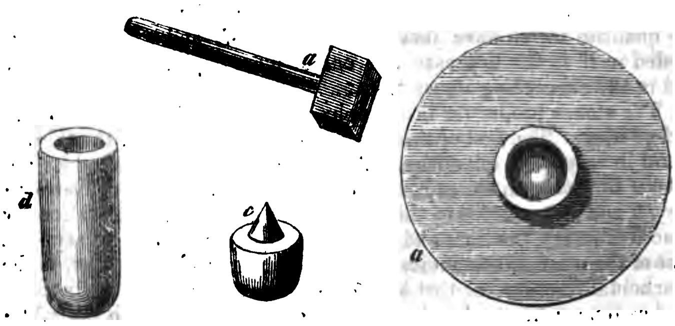
1. *Reniform, or kidney-shaped brown clay iron-stone.*—It occurs massive and globular: sometimes these are hollow (a hollow globular ball, weighing upwards of 21 lbs. is in the Museum, at Columbo); surface sometimes marked with impressed forms: fracture conchoidal; lustre semi-metallic; adheres slightly to the tongue; streak pale brown; specific gravity 3·793 of a specimen from Mutelle; and 4·06 of a specimen brought from the eastern part of the island. The constituent parts, after two careful analyses are:—silica 10; alumina 3; lime 22·5; magnesia 8 5; oxide of iron 50; water 4; loss 2.

2. *Granular foliated lime-stone*—is white and translucent; specific gravity 2·853, constituent parts, lime 50; carbonic acid 42; silica 2; magnesia 2; water 2; and loss 2. It is quarried at Kandy, and employed for building purposes.

3. *Common compact lime-stone.*—Its colour is greyish white; specific gravity 2·578 to 2·6:—constituent parts: lime 52; carbonic acid, 42; magnesia 1·5; water 2·5; loss 2. This specimen was brought from Pœloor cavern, near Jaffna.

SINGALESE POTTERY.

THE pottery of the Singalese is coarse and unglazed, and rather useful than ornamental; though the forms of some of their vessels are elegant, and of a very antique appearance.



In the manufacture, besides a wooden mallet *a*, and a smooth stone to oppose to it, they use only a wooden wheel *b*, which is turned by the hands of an assistant, and revolves on a neatly formed pivot

of stone, that moves in a cavity of a cylindrical stone *d*, fixed in the ground, and sunk to the depth of two-thirds of its whole length: the cavity is well smeared with oil. The head of the pivot is firmly attached by the glutinous matter of the jack-fruit, to a cavity in the middle of the under surface of the wheel. These two stones, called by the Singalese *koodogalle*, are the most valuable part of the apparatus: they last in continued use about forty years, and constitute the present which is usually given by a potter to his son on his marriage.

A NEW METHOD OF SOFTENING CAST-IRON.

To the Editor of the Franklin Journal.

Sir—Having received both amusement and instruction from your valuable journal, I am induced to communicate what appears to me to be a very useful discovery. It is well known, that in casting small articles of iron, the metal will be sometimes so hard, as to resist the file, and all other tools, and is therefore useless; if however, you take the article, and make it as hot as it will bear, without injury, and put on it a small portion of *brown* sugar, the sugar will spread itself rapidly and curiously, over the iron, will penetrate, and render it as soft as the softest malleable iron, and of course, allow it to be cut or filed. I am told, that common salt, or borax, will act on the iron in the same way, but not so thoroughly. I have seen the experiment tried on a piece of casting, about eight inches in diameter, and ¾ inches thick; only half the iron was highly heated, and the sugar, 2 oz., applied to the heated part; the sugar appeared to go quite through this part of the iron, altering its colour and texture, and making it quite soft; while the other half remained white, hard, and incapable of being wrought. I claim not the merit of the discovery, the fact has been known to a few workmen here, for some months, and the information is, of course, extending; that it may have wider circulation, is the wish of Yours, &c.

Boston, August, 25th, 1827. A SUBSCRIBER.

Remarks by the Editor.—We have published the foregoing as we received it; the writer speaks with confidence of the result of the process, and this is the only circumstance which has induced us to insert it. The softening of hard cast iron is, in general, effected either by the addition, or abstraction, of carbon; we do not see how either can be produced by the action of sugar, in the way described: had time and convenience allowed, we would have tried the experiment ourselves; should others do so, we should be glad to hear the result. Our doubts rest upon theoretical grounds; but should facts be against us we give up our theory without regret.

Mechanics.

Improved Telegraphs.—A beautiful chain of telegraphs has been just erected, between Liverpool and Holyhead, by the public

spirit of the corporation of the former town. The telegraph is the invention of a Lieutenant Watson, of the navy; and we understand, it has already had the effect, of preserving a large number of ships from the effect of a storm, by giving notice, along the whole line of coast between these parts, of the state of the wind at each. These telegraphs, though extremely simple, are capable of making 10,000 signals, connected with navigation.—*London Weekly Review.*

Architecture.

HOUSES IN JAPAN.—The houses of the Japanese, are the antipodes of those of the antient Egyptians, and the inhabitants of the Hauran. While the latter, always aiming at massiveness and durability, constructed their dwellings of huge stones, and roofed them with the same material, you here see, upon the little green knolls that skirt the road, delicate little habitations of fine wood, or even of paper. But their light and graceful structure, and their gilded ornaments, glittering in the sun, give them the air of fairy dwellings, which the very breath of heaven might dissolve.—*Ibid.*

Natural History.

FLYING UNDER WATER.—Among the Hebrides on the western coast of Scotland, where the water is always clear, even after a storm, the sandy bottom may be seen at great depths; and from an elevation near the beach may be observed the mergansers, shags, divers, and other aquatic birds, pursuing the sand-eels, cuddies (ammodites tobianus, and the fry of gadus carbonarius,) and other fishes: this they do with almost incredible velocity, using the same motions as if flying in the air, only that the feet as well as the wings are called into action.—*Edinburgh Phil. Journal.*

Horticulture.

PRODUCTION OF POTATOES FROM SEED.—In the autumn of 1823 John Longmead, of Liskeard, planted in the nursery one potatoe apple, of the London frame kind, which produced a number of tops in the spring of 1824; these were earthed up several times during the summer, and when dug produced one hundred and seventy potatoes, from the size of a pea to that of a pigeon's egg; these were again sown in a drill in the following March, and produced more than nine gallons of fine potatoes. By this method a handful of potatoe apples will produce sufficient potatoes to crop an acre of land.

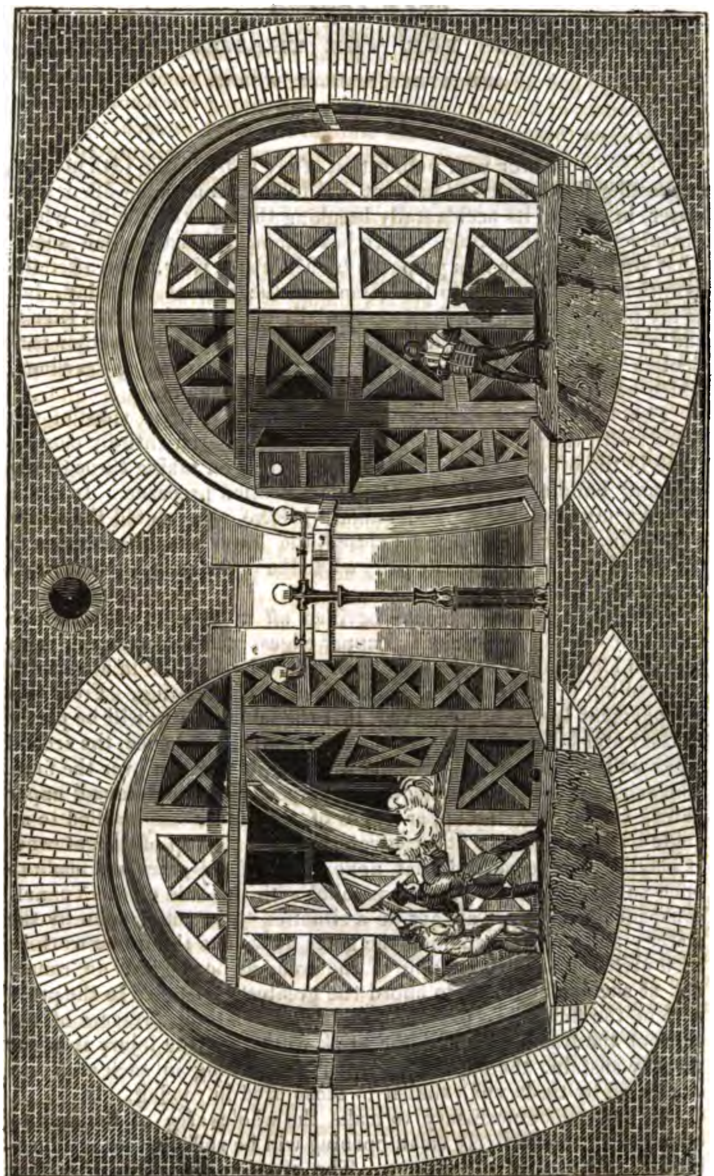
TO OUR READERS AND CORRESPONDENTS.

The great length and importance of our first article, has obliged us to extract several papers of great interest to make room for it; our present number in consequence does not contain the usual variety of new inventions.

N.B. The list of patents will be given in our next.

We have received the several communications of NAUTICUS,—TYRO,—A. B.,—A YOUNG ENGINEER,—and W. H. proposing remedies for the accident at the Thames Tunnel, but trusting that their candour will admit the superiority of Mr. Garvey's and X. Y's. propositions inserted in this number, they will excuse our not giving them a place.

M.W.'s favour from Calais is received; the subject is intended for our next.



FLOOD GATES FOR THE THAMES TUNNEL.

SELF-ACTING FLOOD-GATES FOR THE THAMES TUNNEL,

AND OTHER SIMILAR WORKS.

To the Editor.

SIR,

SINCE your publication of my letter of the 13th instant, suggesting flood gates to prevent the tunnel from being filled with water, in case of its accidentally breaking through the shield, where the miners are excavating, I have been informed that a plan somewhat similar to mine was proposed by Mr. Peter Kier, soon after the irruption of the water into the Tunnel on the 18th of last May; but as my plan is in many respects essentially different from Mr. Kier's, and as you have expressed a wish to be furnished with further particulars respecting it, I have prepared the accompanying drawings, which will render the plan intelligible to your readers.

Fig. 1 *(on the preceding page)* represents a front view of the gates, with those on the right hand or eastern arch entirely closed; those in the other arch having been kept open for taking through the clay and building materials, as the excavation proceeds. In order to make my plan better understood, I have represented the water coming in, which, having just closed the lower pair of gates, is in the act of closing the middle pair, while the upper pair is represented as standing open.

The lower pair of gates are bevilled off to an acute angle, which terminates at the outside of the upper edges, and to correspond with this the lower edges of the middle gates are bevilled off in a contrary way, to lap over the others, as exhibited in the drawing. From this arrangement it will be perceived, that the middle gates will be partly in the water before it runs over the lower gates, and hence, the second gates will be shut as soon as the water begins to run over the first. The same arrangement is made with respect to the middle and upper gates, except that the upper edges of the latter are bevilled to an angle on the inside, to fit a contrary bevil on the top of the gateway. It may be here observed that none of the flood-gates are made to open so far back as to become parallel with the side of the Tunnel, consequently they are always in a situation to be acted upon by the water; and that the whole of the gates as well as the frame work in each arch, meet in the middle of the arch, as flood-gates on canals do, at such an angle as to afford the greatest resistance to the pressure of the fluid. To prevent the outward lateral pressure of the sides of the framing against the brick work, and the injury it might thereby sustain, the opposite sides of the framing in each arch are connected by tie-beams, similar to those used in roofing.

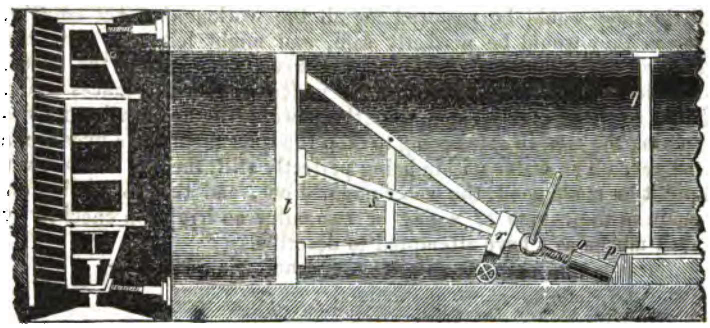
It will not be necessary to make the whole area of the arch to open, as a comparatively small opening will be sufficient for conducting the operation of the miners. The opening gates are therefore represented as occupying only a a small portion in the middle of the strong framing which fills up the arch.

It will of course be of the greatest importance that the threshold or cells, against which the bottoms of the first gates shut, and for that purpose the portion of the road way which passes through the gates, is so balanced and supported, that a very small portion of water accumulated under it will disengage its supports, and project part of the road-way or platform outside of the gates. The threshold may be further secured, if necessary, by a covering of canvass, so attached to the gates as to be rolled off by them in the act of shutting.

The joinings between the frame and brick work, as well as the joinings round the gates, are made air and water tight by triangular packings of leather or other soft material, which are drawn into the crevices by a series of screw bolts through to the outside of the gates, where the workmen can at their leisure screw the packing up after all the gates are shut.

The method of moving the gates forward, and of securing them in their places is shown in Fig. 2, where *l* represents a vertical section of a set of flood-gates, supported in its place by three pair of strong beams, represented at *s*, fastened together at *r*; the other ends of these beams are attached to the flood-gates, three on each side, at a small distance from the edge. The piece *r* rests upon a friction roller or small wheel, and against a powerful screw jack *o*, which is supported by the abutment *p*, fixed into the bottom of the Tunnel, and kept in its place by the vertical beam *q*.

Fig. 2.



When the gates are to be moved forward, the triangular packing round the edges of the frame must be released and moved back, by unscrewing the bolts which keep it in its place, and then the gates are forced forward on the smooth supports on which they rest by the screw *o*, and when they have been moved to their assigned place the screw is returned into its box, and the abutments are brought up, and the whole apparatus again properly secured.

The box represented to the left of the eastern arch is sufficiently capacious to hold two or three men; it is provided with two doors, one of which opens into the box, and the other into that part of the Tunnel, which would be full of water when the flood-gates are all

closed. The use of this box is for a man, harnessed in James's Diving Apparatus,* to enter the part filled with water, for the purpose of exploring and examining the works, and bringing out any thing of importance requiring to be removed from the water. The man, having provided in his diving apparatus a sufficient supply of air for the time he intends to remain in the water, enters the box and closes the door; he then, by means of a stop-cock, admits the water into the box, when the door between the box and the interior can be easily opened to admit him. In coming out he has only to re-enter the box, shut the communication between the box and the interior, and then by a stop-cock let the water contained in the box issue into the open part of the Tunnel.

This may be repeated as often as occasion may require, with very little escape of water, and with perfect safety to the diver; for the ingress of the water being entirely prevented by the flood-gates it will be perfectly quiescent within them, and no danger is to be apprehended from a change or derangement of any part of the works taking place during the miner's inspection.

I mentioned in my former letter that the small space between the shield and flood-gates would soon be filled, when all would become stationary, and consequently, the principal cause of damage to the works, the rushing of a large quantity of water with great violence, would be removed. If it should be objected that the time occupied in filling the space between the gates, and the shield, would be too short to allow the workmen to escape; I would answer, that very little time would be required for all the workmen to get outside, where they would be perfectly safe, and might leisurely view the progress of the water in filling the space and closing the gates. Besides, an irruption of the water under such circumstances would be of so little consequence that there would be no occasion for detaining the men in attempting to stop the torrent till their lives are in danger. The water within being perfectly still, the bed of the river might be made good, the water pumped out, and the work going on again in the course of a day or two after an irruption checked by such means as I have attempted to describe.

I am, Sir, yours, &c.

X. Y.

London, 25th of Jan. 1828.

[We conceive that our correspondent's plan of flood-gates possesses many advantages well worth the attention of persons engaged in conducting works under the beds of rivers. Such as shutting gates by means of the cause which renders the shutting of them necessary; for we suspect that the alarm occasioned by an accidental irruption would prevent men from stopping to shut gates if it depended upon them. The shutting of the gates in successive pairs seems to us another good point, as it will afford the men more time to escape.

* Described—Register of Arts, vol. iii. p. 242.

During the whole of last week the operation of filling up the aperture in the bed of the river, with bags of clay, was continued; but the influx of the water had not then been stopped. With the view of consolidating the clay thrown in the hole, the steam engine in the shaft was employed in pumping out a portion of the water, thereby to increase the vertical pressure upon the clay. None of the bodies of the unfortunate men who were drowned have yet been seen. A report, describing the circumstances of the accident, together with a particular account of the measures now in progress to repair it, will, it is said, be laid before the proprietors of the Tunnel this week.]

IMPORTANT EXPERIMENTS WITH STEAM.

To the Editor of the Register of Arts.

SIR,—I HAVE been recently conducting some experiments, with a view to ascertain the nature and properties of steam at very high densities; and having, during their progress, met with a result which surprised me, inasmuch as I do not remember to have read or heard of any similar, I send you this statement for insertion in the Register.

The apparatus employed consisted of tubing of half an inch diameter, in which steam was formed by the injection of water from a common forcing pump: having ceased pumping for a short time, while the firing was continued, I found, on again injecting water, that steam was generated at so great a temperature, that on passing it through about 9 feet of tubing outside the apparatus, and exposed to the atmosphere, the tubing became of a bright red heat through that whole length; and I have no doubt that the same effect would have been continued to a much greater distance, had the tubing been longer.

The steam (which when allowed to escape into the air, was perfectly invisible) was conducted into a high-pressure boiler, filled with water, when, parting with its superfluous heat, it in a few seconds raised a safety valve, loaded with 70 lbs. on the inch, and gave forth steam in great volume, and of proper density, fit in all respects for the working of a steam engine.

It is very obvious, from this experiment, that capillary boilers, unless some means can be found for confining and regulating the degree of heat, cannot be rendered serviceable for steam engines, as steam, such as I have described, would ensure the rapid destruction of any machinery.

Your obedient Servant, P.

18th Jan. 1828.

PATENT IMPROVEMENTS IN FIDS FOR MASTS,

By SIR ROBERT SEPPINGS, of Somerset House.—*Enrolled November*, 1826.

THE important operations of fidding and unfidding the top-masts of ships, and the great difficulty with which it is frequently effected at crisises pregnant with danger, has of late years excited the inge-

nuity of men of science as well as of mechanics, to devise a better method of performing it. In our former numbers we have particularly described two very excellent methods; the one by Benjamin Rotch, Esq. the other by Mr. George Smart. Since the publication of those papers there have been three other patented contrivances for a similar object, which we shall probably, ere long, give some account of, but which we passed over at the time from not entertaining so favorable an opinion of them as the former two. Sir Robert Seppings's method, above-mentioned, is described in his specification to consist in the application of screws to this purpose.

Upon each trestle tree is to be fixed a metallic plate, having a hollow screw for the reception of a solid screw with a convex head. On the convex heads of these screws the fid, placed as usual, is to be supported. The under-side of the fid from end to end is made concave, that it may rest securely on the heads of the screws. The screws are turned by short levers, and relieve the pressure of the mast upon the fid, so that the latter can be easily withdrawn. The process by which this is effected is not very clearly described in the specification, to which no drawings are attached.

A NEW COMPENSATION PENDULUM.

Invented by R. Lee Fearn, M. D. with general Observations upon the Subject.—*By the Editor.*

The gentleman above named, has presented us with a drawing of an improved compensation pendulum, which is as ingenious as it is simple, and which, it appears to us, will answer well in practice.

We are indebted to that eminent artist, George Graham, for the first application of the principle, which, under various modifications, has been since applied, to preserve unchanged, the centre of oscillation in a pendulum, and thus to insure the performance of all its vibrations, in the same length of time.

When the art of clock-making had attained a high degree of perfection, and the application of this instrument to astronomical observations rendered the utmost accuracy desirable, it was soon perceived, that the varying length of the pendulum rod, in consequence of its expansion by heat, and contraction by cold, was a source of irregularity, which it was deemed difficult to overcome. Those substances which were found to be least alterable by changes of temperature, such for example as wood, and particularly deal, (pine) were employed, in the best clocks. As the different metals are affected by heat in different degrees, Graham conceived the idea that the greater expansion of one, might be applied to counteract the less expansion in another. After a series of trials, during a period of five or six years, he succeeded perfectly, by attaching to the pendulum rod, a vessel containing mercury, which liquid, when the rod was expanded by heat, rose, from the same cause, in the vessel which contained it, so as to compensate for the downward expansion of the rod. This improvement was completed in the year 1721.

Five years afterwards, John Harrison, a carpenter, of Barton, in Lincolnshire, subsequently so celebrated for his improvements in chronometers, invented, and applied to a clock of his own manufacture, the pendulum, which, from its form, is called the gridiron-pendulum. In this, the expansion of the iron rod. is corrected by the greater expansion of rods of brass, or of zinc, which tend to raise the bob, in the same degree in which the expansion of the main rod, tends to lower it; and it of course, is retained in the same place. In this form, the compensation pendulum is, to the present day, most commonly made. The principle upon which these pendulums were constructed, has received various modifications in the hands of different artists: the rods of Harrison's, for example, instead of being arranged in the form of a gridiron, have been enclosed in a tube, and greater elegance and compactness, with a more easy mode of adjustment, have been attained: these, however, we believe, comprise the whole merit of the modern improvements.

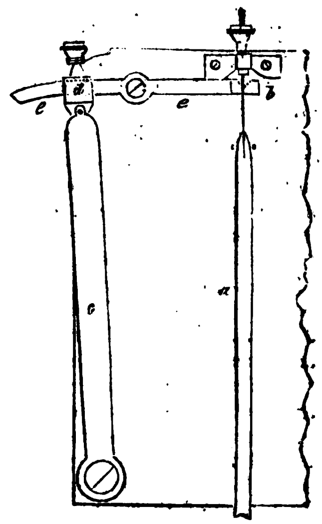


Figure 1, represents the mode of compensation, proposed by Dr. Fearn. *a* is the pendulum rod, suspended by a flexible spring, in the usual manner, from the cock *b*. *c*. is a rod, or bar, of zinc, attached to the back plate of the clock, by a screw at its lower end. The head, *d*, of this bar, works upon a pin, which forms a joint, as represented in the drawing. Through this head, there is a mortice, which allows one end of the lever, *e e*, to pass through it, and within which it may be fixed firmly, by means of a tightening screw. The lever *e e*, is attached to the clock plate by a screw, which is also its fulcrum. Through a slot, in the inner end of this lever, the suspending spring passes, and is closely embraced by it, on its lower side.

The operation of this apparatus, will readily be perceived; as the rod *a* lengthens by heat, or contracts by cold, the rod *c*, will be similarly affected. The expansion of *c*, will cause the inner end of the lever to descend, and, consequently, to embrace the suspending spring, at a lower point, and thus to diminish the effective length of the pendulum. The mode of adjustment is obvious, as a greater, or lesser motion may be given to the lever, the upper end of the rod *c*, being made to approach, or recede from its fulcrum. To obtain the requisite accuracy, an adjusting screw may be made to act upon the head *d*.

We are aware that the clock plate will expand, when the rods of iron and of zinc, undergo that change, but the superior expansion of

the zinc, will still render the attainment of the compensation perfectly easy.

The inventor has proposed some other modifications of the same principle, but as we deem the one represented, the best, we present it alone, leaving the variations, and the details, to the judgment of the practical mechanic.

A CANNON OF 500 YEARS STANDING.

To the Editor of the Register of Arts.

SIR,

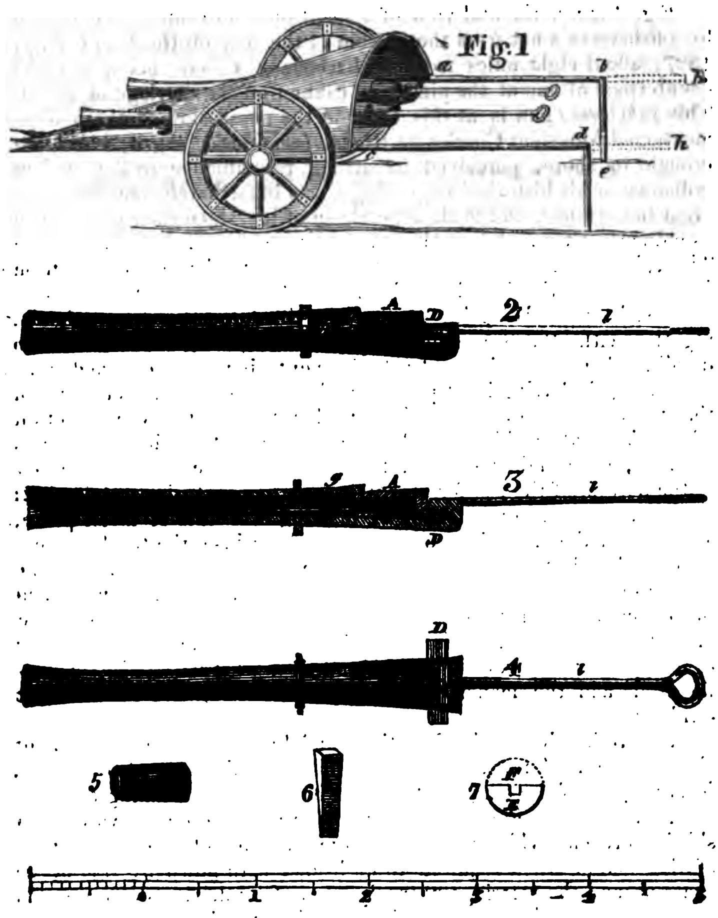
As a subject of a very extraordinary nature, which must be extremely gratifying to the curiosity of the subscribers of the Register of the Arts, I beg leave to forward for insertion in that work, a description (with the annexed diagrams) of a small piece of ordnance, by some unaccountable manner lately taken in a fisherman's large net, and brought up from the bottom of the sea, about eight miles from the harbour of Calais, supposed to have lain there *nearly five hundred years.*

Publicity of this circumstance was given in the Calais journals, on the 15th and 29th August, 1827, which was copied into various other Gazettes of France, and, if I be correctly informed, even of Great Britain.

Figure 1 is the representation of a piece of ordnance as constructed in the earliest ages of this important invention, to be seen in three historical paintings of the great dining parlour, at Cowdry, in the county of Sussex, one of the seats of the late Lord Viscount Montagu; the first being the march of King Henry VIII. from Calais towards Boulogne; second, the encampment of the English forces at Marquise, or, as it was then called, Marqueson; and the third, exhibiting the siege of Boulogne; the taking of which (observed Sir Joseph Ayliffe) by this renowned monarch, added glory to the British arms, and signalized the year 1544 in our national annals.

Three fine engravings of these ancient memorials of English glory are now in possession of Monsieur Charles de Rheims (a scientific gentleman, and respectable ship broker, of Calais,) and have represented in them, among various other objects of antique curiosity, several ordnance carriages supporting cannon; two of these being upon each of them, as sketched at Fig. 1 in the annexed drawing; the carriage itself has a remarkable shape, there being from the back part of it to the front, almost covering the two guns, a sort of half cone, in a horizontal position, with the broadest part next to the shafts; this (as is conjectured by some professional connoisseurs who have seen it) being formed of iron or some other metallic substance, as a species of shield or cover, to protect the artillery-men standing behind it from the fire and destructive arrows of the enemy; the small end of this demi-cone being constructed with sharp points, as some defence to the cannon, in case the foe made a charge upon them.

This piece of ordnance was manœuvred about the field of battle in time of action, by men stationed at the two arms *a b* and *c d*, and



these arms occasionally rested on the perpendicular stands *b e* and *d f*; to this we may conclude, as has been conjectured by some ingenious gentlemen who have now investigated the affair, that the two perpendicular stands, when required, were turned up, moving upon hinges at *b* and *d*, so as to prolong the two arms, which by this contrivance were transformed into shafts to receive a horse, from *a* to *g*, and from *c* to *h*, the additional lengths thus acquired being marked by the dotted lines *g b* and *h d*; and this supposition is greatly confirmed by regarding *these shafts* (in the engravings) *where the horses appear within them*; when, it is observed, that there are no parts of them hanging down, in a perpendicular position, as in the former instance.

Fig. 2 is a horizontal view of a small piece of cannon, brought up by a fisherman's net from the bottom of the sea, on the 1st of July, 1827, about eight miles from the harbour of Calais, being an exact counterpart of one of the pieces of cannon on the carriage of N°. 1. This *submarine* gun is at this time in the possession of the before-mentioned Monsieur Charles de Rheims, who on seeing it, when first brought on shore, perceived its strong resemblance to the ancient ordnance in his historical engravings, was immediately sensible of its great importance, and made a purchase of it; since then it has been examined most minutely and with the greatest attention, by General Tirlet, inspector-general of the French artillery, (lately returned from London after viewing the ordnance of Great Britain,) as also by Messrs. Blot and Boudain, officers of artillery, on service at Calais, together with other scientific and professional men, too numerous to detail; when, to their great astonishment, it was ascertained to be still charged, having in it powder and a *leaden* bullet, a clear proof that the operation of loading it had taken place before the invention of *cast-iron* balls: this bullet had a covering of tow, its diameter is 1·4 inch, and weighs 9 ounces: the gunpowder after being immerged at the bottom of the sea for nearly three or five centuries, retains still its natural smell, some portion of it being in a state of moist paste, and the remainder in form of the original grains; the total, nevertheless, has lost its force or explosive quality, on account of the nitrate of potass, one of its component parts, having been worked out through the touch-hole, and the rest being mixed with muriate of soda from the sea. It is worth observing that the carbon, another of its component parts, is as pure and fresh as if it were just manufactured, and the leaden bullet, after centuries, not in the least oxidated.

Fig. 3 is a longitudinal section, and Fig. 4 a bird's-eye view of the same gun; *l* representing the tail-tree, this being also of iron, forming part of the cannon, to adjust it with ease in taking aim.

A A and C in Figures 2, 3, and 4, are three different views of a shifting breech, which was detached and taken out of the after part of the cannon when required to be loaded with powder; this being charged, and the cartridge properly secured by driving down upon it in the very muzzle of this shifting breech, an oaken plug, was then replaced in its original position, against and of course behind a bullet, which in the meantime had been put into the barrel of the gun; and in this prepared state the entire was ready for taking aim and firing. This shifting breech is shown separately by Fig. 5.

D D D, in Figures 2, 3, and 4, are three views of an iron wedge, which was made use of to drive in horizontally across the gun, between its butt end and the shifting breech, so as to secure the firm position of this when firing: shown also by separate figure (6).

E, Fig. 6, is the figure of the after part of the gun barrel; and F is the other half, within the dotted semi-circumference; this being cut off so as to take out the shifting breech, and replace it again with facility.

g g, Figures 2 and 3, is the leaden bullet, in front of the shifting breech.

The gun itself, when first brought up from the bottom of the sea, was covered with a sort of *petrified* rust, about two inches thick; of this it has now been cleared: in length, including the tail tree, it is 5 ft. 11 in.; its diameter about the centre of the barrel is 3 in., its bore for the passage of the bullet 1½ in.; its weight 64 lbs.; and is constructed of wrought iron, which also proves its great antiquity; those of modern ages being invariably of *cast-iron*, of which, had this been formed, it must in a few years have been totally decomposed in sea water; as has been proved lately by cast-iron pipes for steam, that have been converted thereby into a kind of soft black lead.

It is supposed to have been sunk by some unfortunate shipwreck, on being transported back after the celebrated battle of Cressy, fought by Edward III. in 1346; in which affair it is particularly recorded, that this great warrior struck terror into the French army, by five or six pieces of cannon, it being the first time they had encountered such thundering machines. Should this gun have been actually in the battle of Cressy, it is more than probable that it was likewise one of the pieces of ordnance at the subsequent siege of Calais. Or, it might have been one of the light field-pieces at the battle of Agincourt, fought and gained by the heroic Henry V. in 1415: who, after his glorious victory, immediately continued his march towards Calais; still under some little apprehension of having a second engagement with the enemy, much more numerous than his own handful of veteran troops, and hovering at no great distance from them: enraged, too, at their recent astonishing and overwhelming defeat. Under this impression (as it is minutely detailed by Nicholas Harris Nicolas, Esq. F.S.A.) when the conqueror was informed that several horse loads of armour, taken from the enemy were brought to his quarters, he issued a proclamation throughout his army, prohibiting any one to take more than he wanted *for his own person, as they were not yet beyond the power of the French King*; hence, we ought not to wonder if the cannon were kept constantly loaded, (the charging in those days being a long operation) to be in readiness for firing in case of a sudden attack; this will account for the piece, of which I now write, being loaded; and it might afterwards have been put on board-ship in the hurry and confused bustle of a grand embarkation, without the modern precaution of the charge being previously withdrawn.

This inference is further justified by the fisherman who found it at sea, and who brought it on shore, asserting that it was taken up to the *eastward* of Calais; as it is a fact that on Henry with his fleet sailing out of this port for Dover, although the wind at the commencement of the voyage was favourable, all of a sudden a terrible storm arose, with the wind veering to the westward, which drove some of his shipping struggling against the tempest *to the eastward*, upon the coast of Holland; during which awful period it is recounted that two vessels, with all on board perished, belonging to Sir John Cornwall.

A third opinion has been slightly advanced, that this gun may have been sunk in the expedition under Henry VIII. after the memorable siege and taking of Boulogne, in 1544, as it resembles in every

respect some of the ordnance represented in the forementioned historical paintings at Cowdry;* but the two former ideas of its having been at the battle of Cressy, or in that of Agincourt, are by far the most probable, as pronounced by connoisseurs; making this cannon, in either case, between four and five hundred years old: it now appearing a venerable monument, to remind the present generation and future ages, of the laurels gained some centuries back by our brave forefathers, in two of the most glorious battles ever fought by the gallant sons of Great Britain.

By inquiries, made for the express purpose within these three or four months past, it has been ascertained that no similar piece of ordnance is to be found either in France or in the Tower of London; nor is there any written document of such a one in any place whatever to be seen: in France the oldest gun being only of the year 1648, not even of two hundred years standing; and consequently, this, which I have now seen with wonder and pleasure several times, and of which, for the information of the world at large, I have drawn up the above description, (with the permission and assistance of the liberal proprietor,) we may conclude to be the oldest in all Europe; in fact, the father of every piece of ordnance having, to the surprise of the living world, started from a watery grave, after being for centuries buried in oblivion.

It is a remarkable fact, that the shifting breech appertaining to this cannon was similar in principle to the *patent* shifting breech on some fowling-pieces of the present times, which the modern inventor may conceive to be a contrivance alone of this enlightened age, of course erroneously; but this fact by no means militates against his individual ingenuity, nor against his patent, the system having been so long forgotten: to the contrary, it enhances the value of his invention, by showing to the public its former general practice on a grand scale. It is worthy of remark that this gun may still be made use of in firing without the least danger.

I remain, Sir,
Your most obedient Servant,
M. P.

Calais,
December 26, 1827.

ESSAYS ON LITHOGRAPHY. NO. II.

(Continued from p. 317.)

Of Polishing the Stones.

Polishing is an operation, by means of which, a uniform and flat surface, and a polish more or less high is given to a stone, according to the different kind of design, or of work for which it is intended. The care and precision with which this first preparation of the stone

* It can be safely presumed that, although guns of this sort were made use of at the siege of Boulogne, by Henry VIII. that they were of much older date, as the king was obliged to serve himself with ordnance from the arsenal of Calais, which had been the depot of every species of military stores, since the battle of Cressy, or rather subsequent taking of Calais in 1347.

is effected, are not of less importance to the execution of the design, than to that of the impression. A stone, the grain of which is unsuitable for crayons, will not allow the artist to regulate his tints, and to give them harmony; when he works in ink, or with the dry point, he will meet with other obstacles, if the polish of the stone be not perfect; and, in each case, his drawings will be defective; but they will be much more so if, in the surface of the stone, there are undulations, hollows, stripes, &c.

Stones are polished with sand, by rubbing them one on the other. The best sand for this purpose, is that quartoze sand which is fine, and hard-grained. In Paris they, in general, make use of a yellow sand which, though fine, requires to be sifted. It is necessary to be very careful that the sand which is used be not mixed with gravel, or any sharp angular substance, which would form stripes on the stone, the hollows of which would not receive the printing-ink, and there would, consequently, be white marks on the impressions. This serious evil is avoided by sifting the sand before it is used, and by rubbing the upper stone slowly, at the commencement of the operation, and occasionally turning it round upon the lower stone.

The kind of design for which a stone is intended, determines the kind of polish which should be given to it. A work in which crayons are used, cannot be executed unless the stone have a grain left upon it; all other kinds of drawing, require surfaces which have the polish of marble. Whether we wish to employ a fresh stone, or to renew one which has already been used, it must equally undergo the process of polishing. For this purpose it is placed on a table, in the manner to be hereafter described; a little sand is very equally sifted over it, which is moistened with a very little water. On the first stone is placed a second, as nearly as possible of the same dimensions, and the upper one is rubbed about, in a direction nearly circular, but drawing it successively towards the four corners, and continually changing the relative position of the stones, so that every part of their surface may be subjected to an equal degree of friction. If this be neglected, and the stones be pressed on each other, and the circular motion be always the same, hollows will be formed, and uneven surfaces produced, and these irregularities will show themselves in the impressions. It is easy to ascertain, by means of a straight edge, whether the stone be well levelled.

At first the motion should be slow, and the pressure trifling; the rapidity of the one, and the force of the other, increasing as the sand becomes equally distributed. When the sand becomes reduced to a paste, it no longer acts upon the stone; fresh sand must, therefore, be taken until the stone be perfectly smooth, and there no longer remain on it the traces of any former design. The ink which formed this design may have been made to dissapear, without our having removed the source of its reproduction. This cause exists in the particles of the fatty substance of the crayon, or of the ink, which have penetrated below the surface of the stone, and which, being again brought in contact with the printing ink, will retain it, and reproduce parts of the old design. It may be known that this

cause exists, when it is perceived that, on the *wet* stone, there are light traces of the former drawing. It is then necessary to continue the rubbing until these have entirely disappeared. The aqua-fortis employed in the preparation, will, by itself, produce this effect when the traces are very superficial. It should be remarked, that of two stones of the same size, the lower becomes polished sooner than the upper one. To avoid this, it is only necessary to change their position.

In order to produce on a stone intended for a drawing in crayons, the grain which it ought to have, it is necessary, after having treated it as we have just described, to sprinkle and rub it again with fine sand, which, by the friction which it produces, may be made to give the desired grain. When it is wished to obtain a coarse grain, the stone is rubbed for a less space of time with the sand, this being also renewed more frequently; but the rubbing with the same sand is prolonged when a very fine surface is desired. This rubbing, however, should not be continued too long, or the grain which has been produced will be destroyed. The state of the grain may be judged of by blowing briskly on the surface of the stone, on which has been placed a little clean water, and then examining its plane, by looking at it in an oblique direction.

When stones, intended for drawings in ink, or with other materials, fit for lithography, are to have a very high polish given to them, the procedure is the same as that we have just described, excepting only, that after having produced a fine grain on the surface, the rubbing is continued with the same sand, reduced to a thin paste, taking care to wet the stones when the adhesion between them becomes so great as to prevent them moving freely. The workman, when he discontinues his labour, should not leave the stones in this state, as they would adhere, and could then be separated only by steeping them in a vessel full of water.

The stones having acquired by the operation described, a certain degree of polish, are well washed, in order to remove the grains of sand, which might produce scratches; a fine polish is then to be given to them by means of pumice-stone. This polishing is effected on one stone at a time, by rubbing it with a large piece of pumice-stone after it has been slightly moistened. The rubbing should be in a straight line, sometimes in one direction, and sometimes in the opposite, passing successively over all parts of the surface of the stone. By thus rubbing with the pumice-stone, and the white paste which it produces, only adding water enough to preserve a slight degree of moisture, the beautiful polish of marble is produced. It is afterwards necessary to wash the stone in a considerable quantity of water, rubbing it with the hand, or with a cloth entirely free from grease, and thus to remove any particles of matter, which, by their position on the surface of the stone, would present a substance intermediate between that surface and the drawing, which would prevent the adhesion of the latter.

Three kinds of grain may be given to stones—the course, the middling, and the fine. The first produces designs, the proofs of which

have not the finish and the delicacy of those which are obtained on the two others. The second ought, in every case, to be preferred; for it possesses all the properties requisite for beauty of execution, although the proofs which it produces have not an appearance quite so soft, and mellow, as those from stones with the finest grain. But these last have the great disadvantage of soon losing the delicacy of the design, of clogging readily, and, consequently, of affording much fewer proofs. In every case it is necessary that the grain should be smooth and uniform over the whole surface of the stone; otherwise, the lines traced by the crayon will be found nearer to each other, or more strongly marked in some places than in others; the proofs, in reproducing the same defects, will be found without harmony, and without effect.

When it is intended to execute very beautiful designs, it is necessary to reject the stones which are too soft; those which have hollows; those whose texture is softer in particular spots than in the general mass; those which are not of an equal thickness, and which have inequalities in their upper or under surface; those, in short, which are not of a good texture, and well polished.

A last precaution, is to preserve the grained, or polished stones, under cover, to protect them from the air and the dust; and not to touch them with the hand, or any greasy substance, on that side which is to be worked on. They are preserved by wrapping them up carefully in an envelope of white paper.

(To be continued.)

Useful Arts.

Plating Iron.—From the same source we are also informed that a metallic alloy for plating iron, and protecting it from rust, has been invented by the same gentleman; it is easily and cheaply applied, forms an *amalgam* with iron, penetrates some depth, and effectually prevents it from rust. This property it derives from its refusing to unite with oxygen at common temperatures, or even when artificially heated. It is formed out of many metals. It does not increase the hardness of the article to which it is applied, nor does it efface the finest lines on the surface: it does not injure the temper of the knives. Four ounces of this composition are sufficient to cover an iron bedstead. A company with a large capital has already been formed at Bologna, for coating iron-work; and they are now drawing out plates, which can be united to one another by heat, without any injury to the casting.

LIST OF PATENTS.

REFRIGERATORS.—To R. Wheeler, of High Wycombe, Bucks, for improvements in Refrigerators for cooling fluids. To be inrolled by 22nd May, 1828.

WOOLLEN MANUFACTURE.—To W. J. Downing, of Poulshot, Wilts, for improvements in machinery for "rollering" wool from the carding engine. To be inrolled by 22nd January, 1828.

LAMPS.—To John Roberts, of Wood Street, and Geo. Upton, of Queen Street, Cheapside, for improvements in argand lamps. To be inrolled by 24th May, 1828.

PEPPER.—To J. A. Fulton, of Laurence Pountney Lane, London, for a process of bleaching pepper. To be inrolled by 26th May, 1828.

SUBSTITUTE FOR CRANK. To J. Apsey, of John Street, Waterloo Road, Lambeth, for a substitute for the crank in machinery. To be inrolled by 27th May, 1828.

CARTRIDGE CASE.—To J. Jenour, of Brighton Street. St. Pancras, for a new cartridge case. To be inrolled by 28th May, 1828.

SAFETY LAMPS.—To Thomas Bonner, of Monkwearmouthshire, Durham, for improved safety lamps. To be inrolled by 4th June, 1828.

SUGAR.—To W. Fawcett, of Liverpool, and M. Clark, of Jamaica, for improved apparatus for the manufacture of sugar from the canes. To be inrolled by 4th June, 1828.

METAL TUBES.—To R. W. Winfield, for improvements in tubes or rods, and the preparing of same to form parts of bedsteads, &c. To be inrolled by 4th June, 1828.

CARRIAGE WHEELS.—To John Meaden, of Millbrook, Southampton, for improved carriage wheels. To be inrolled by 4th June, 1828.

MANGLES.—To Samuel Wilkinson, of Holbeck, York, for improvements in mangles. To be inrolled by 4th June, 1828.

SPINNING.—To Maurice de Yongh, of Warrington, Lancashire, for improvements in spinning machinery. To be inrolled by 4th June, 1828.

BUTTONS.—To T. Tyndall, of Birmingham, for improvements in the machinery for making buttons. To be inrolled 4th June, 1828.

NAILS.—To D. Ledsam, and W. Jones, of Birmingham, for improvements in machinery for cutting nails, brads, &c. To be inrolled by 4th June, 1828.

BRUSHES.—To J. Robinson, of Limehouse, for improvements in the manufacture of brushes. To be inrolled by 4th June, 1828.

PROPELLING VESSELS.—To Paul Steanstreep, of Basing Lane, London, for improved machinery for propelling vessels. To be inrolled by 4th June, 1828.

POWER-LOOMS.—To J. H. Sadler, of Hoxton, for improvements in power-looms for weaving. To be inrolled by 13th June, 1828.

BALLASTING SHIPS.—To Ralph Rewcastle, of Newcastle-upon-Tyne, for an improved method of ballasting ships. To be inrolled by 13th June, 1828.

DISTILLATION.—To R. Stein, of Regent Street, for an improved application of heat to distillation. To be inrolled by 13th June, 1828.

CASTORS.—To Frederick Benjamin Geithen, of Birmingham, for improvements on castors for furniture, &c. To be inrolled by 13th June, 1828.

POWER.—To Henry Peto, of Little Britain, London, for "an apparatus for generating power." To be inrolled by 13th June, 1828.

KEYLESS WATCH.—To J. A. Berrollas, of Nelson Street, St. Luke, Middlesex, for improved watches and clocks, to be wound up without keys; and for a farther improvement upon his detached alarm Watch (described in our 9th number). To be inrolled by 13th February, 1828.

PROPELLING VESSELS.—To A. M. Skine, of Jermyn Street, Middlesex, for improvements in the mode of propelling vessels, and in working water wheels. To be inrolled 15th June, 1828.

PROPELLING VESSELS.—To J. L. Stephens, of Plymouth, for improved methods of propelling vessels, &c. To be inrolled by 18th June, 1828.

NAILS.—To J. Tyndall, of Birmingham, Warwick, for improved machinery in making nails, brads, &c. To be inrolled 16th June, 1828.

PRESERVATION OF SHIPS' TIMBER.—To John George, of Chancery Lane, for a mode of preserving ships from dry-rot, and the goods on board from the effects of heat. To be inrolled by 18th June, 1828.

LOCOMOTION.—To T. S. Holland, of London, for machinery for generating and communicating power and motion, applicable to propelling fixed machinery, floating bodies, carriages, and other locomotive machines. To be inrolled by 19th June, 1828.

LOCOMOTION.—To Dr. W. Harland, of Scarborough, York, for certain improvements in machinery for propelling locomotive carriages. To be inrolled by 21st June, 1828.

MASTS.—To C. A. Ferguson, of Mill Wall, Poplar, and J. F. Atlee, of Prospect Place, Deptford, for improvements in the construction of made masts. To be inrolled by 22nd June, 1828.

PROPELLING VESSELS.—To W. Hale, of Colchester, for improvements in propelling vessels. To be inrolled by 22nd June, 1828.

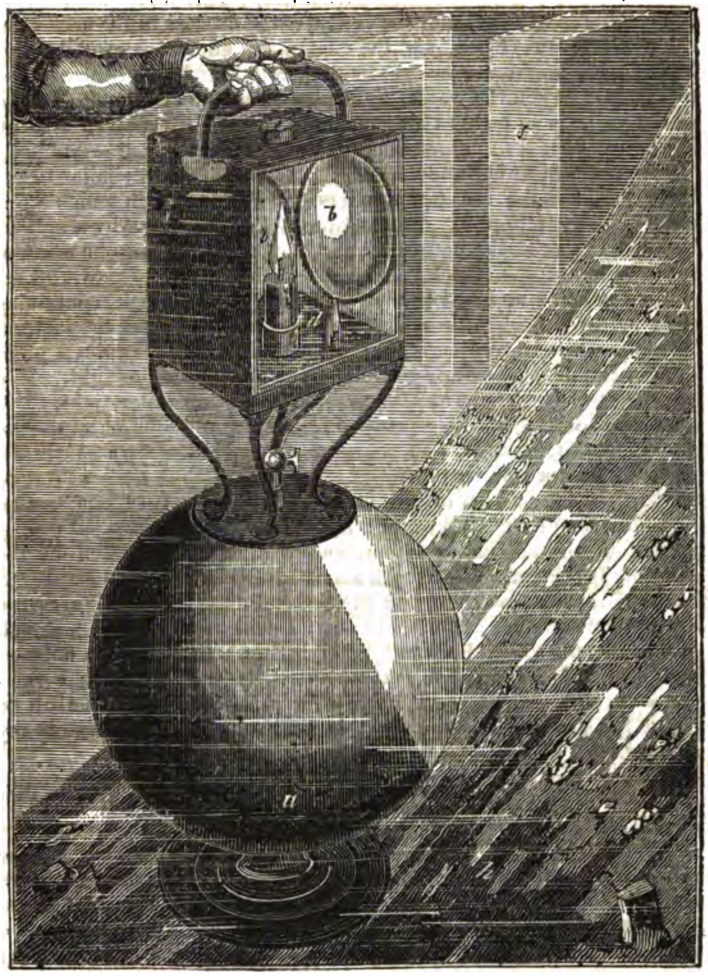
TO OUR READERS AND CORRESPONDENTS.

The three succeeding numbers of this work will contain Ground Plans shewing the appropriation of the different rooms in the London Mechanics' Institution, accompanied by a descriptive account.

St. C's proposition for ships pumps is pretty and ingenious, but the cost of so many cylinders would be fourtimes that of two cylinders whose areas together are equal to the sum of the areas of the former. The friction, or waste of power, would be in about the same ratio.

The parallel-motion of R. S. must, we think, have been sent to us by mistake for another work? It will not suit the Register.

Mr. D's suggestion is good,—we thank him for it.



LAMP FOR BURNING UNDER WATER.

To the Editor of the Register of Arts.

SIR,

HAVING been much pleased with the plan of your ingenious correspondent, X. Y., for the construction of flood gates to stop the progress of water in the event of another accident at the Thames Tunnel, I take the liberty of sending you a description of what I conceive to be an indispensable appendage to the diving apparatus of the person who might enter the water, in the way proposed

by X. Y.; viz. a lamp to burn under water. This would not only be indispensable in examining the extent of the damage in the arch after the aperture was closed, and the consequent admission of light prevented, but might, I conceive, be of almost equal importance in the diving bell, when the water, as is frequently the case at this season of the year, is so turbid that sufficient light is not refracted through it at great depths to permit accurate examination.

A spherical or cylindrical vessel is to be provided, similar to the vessels containing the portable gas for burning, into which a few atmospheres of pure oxygen gas are to be condensed by a syringe through a valve at the bottom; a short jet tube is then to be screwed into the top of the vessel. A lantern with strong and powerful reflectors must be attached to the upper part of the vessel, containing the condensed oxygen, permitting the jet tube to enter the lantern. The top of the lantern must be provided with a screw cap. A piece of wax candle may be advantageously employed for the light. It is needless to say that the apparatus must be air and water-tight.

Immediately before use pour into the lantern a solution of caustic alkali, potash, or soda, and screw on the cap; then turn gently the cock to admit a sufficient quantity of oxygen through the jet tube, to support the combustion of the candle. The products of combustion will be carbonic acid and water: the former will be absorbed as it is formed by the alkaline solution, and the latter condensed by the sides of the lantern. The oxygen admitted will unite with the nitrogen of the air in the lantern, (which is not consumed) and will occasion a supply of ordinary atmospheric air. I send you herewith a sketch of the lantern which I am now constructing, and it will be finished before this appears in your next number. If your scientific correspondent, X. Y., or yourself, feel a wish to see it in action, I shall be happy to show it you, and for this purpose send you privately my address.

I am, Sir,

Your most obedient Servant,

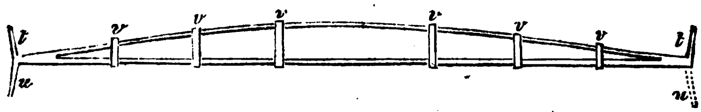
I. H. G.

Reference to Engraving.—*a* the vessel of condensed gas; *b b* the reflectors, placed at suitable angles to accumulate the light upon a bull's-eye magnifier fixed in front, but removed in the drawing to show the interior of the lantern; *c* the screw cap of the lantern; *d* the alkaline solution; *e* the jet pipe; *f* portions of the shield frames; *h* accumulation of mud and earth, as it may be supposed to have entered the Tunnel.

TRUSSED GIRDER OF WROUGHT IRON,

By Mr. George Smart, of King's Arms Wharf, Lambeth.

The girder is made by welding an arched bar of wrought-iron to a longer straight bar, and then turning the ends of this latter either up or down as may be most convenient for the particular use to which the girder is to be applied. F represents the girder, *t t* being the



places where the bars are welded together; *u u* the ends of the straight bar, turned either up or down. The arch is prevented from giving way or buckling when the weight presses upon it, by means of blocks of well-seasoned wood inserted at intervals between the two bars, and secured in their places by the iron straps *v v*, and which inclose both bars. Beams of wrought-iron made in this way will, in Mr. Smart's opinion, support a weight so much greater than cast-iron ones of equal dimensions, that they may be made of any given strength, at half the cost of equivalent cast-iron beams.

This mode of forming bearing bars has been used in a new and ingenious manner, to sustain weights of extraordinary magnitude. A very heavy mass of brick-work, over a gateway leading from the Poultry, is supported in this manner, under circumstances which would have precluded the use of timber, and with a degree of permanent durability, of neatness, and of architectural propriety, which would not have been compatible with a timber support. The lateral thrust of a heavy brick arch over the same gateway is resisted by a similar contrivance. Mr. Smart recommends it strongly for bond joists, &c. as affording an easy way of securing angles and party walls, where in consequence of the occurrence of chimney flues, it is not safe to use timber. Strong bridging and cieling joists are easily made from wide hoop iron rivetted together, with a slip of poplar between them to hold the flooring or lath rails. Neither fir nor oak, if thin, will endure nails being driven into or through it without splitting, nearly so well as poplar will; and this wood, besides being very durable, if kept dry, has the advantage of being much less combustible than either of the former.—*Trans. Society of Arts.*

For the above invention Mr. Smart received the Silver Vulcan Medal of the Society of Arts. A very similar, and equally excellent contrivance of a *wooden* girder, by the same gentleman, is described by us in the 2nd N°. (present series) of this work.

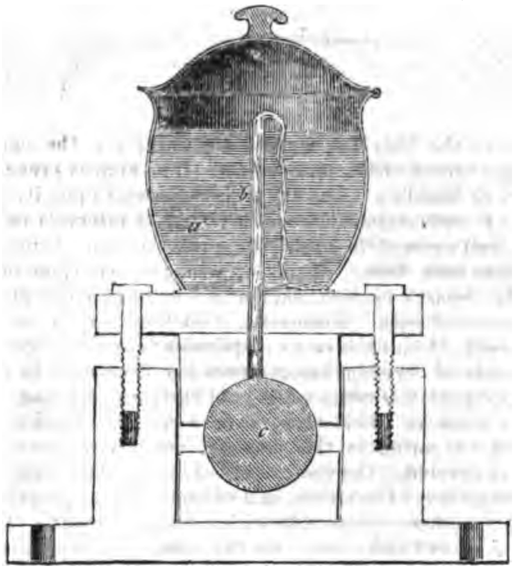
PATENT LUBRICATOR

FOR THE BEARINGS AND SHAFTS OF MACHINERY,

By Mr. John Barton, of No. 38, Seward Street, Goswell Street.

The annexed cut is a sectional representation of this invention, together with the manner of applying it to the shafts of mill work, by which they are constantly kept oiled with a *uniform* supply, and entirely without waste.

a shows a section of a metallic vessel filled with oil, and closed by a lid to prevent the admission of dust or other adventitious matter; *b* is a small tube, rising to nearly the top of the vessel, and



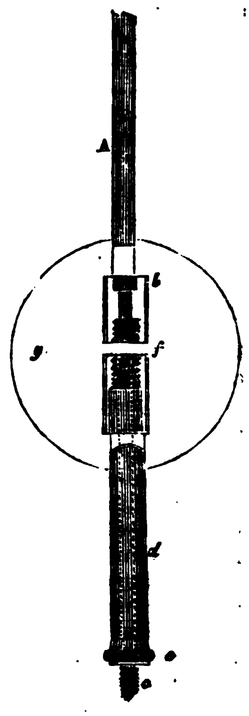
with the lower end extending an inch or two below it, and inserted into an aperture made through the plummer block, directly over the shaft *c*, shown also in section: through this tube *a few* threads of woollen yarn are drawn, which reach to the bottom of the vessel, and conduct the oil by capillary attraction, as a syphon, in minute but regular quantities, to the shaft or gudgeon: the whole of the oil in the vessel is thus carried over entirely free from dust or other impurities, and in the precise quantity required, which is easily regulated by the number of threads.

It must be obvious that the economy of this contrivance is very considerable; that machinery where it is applied will run with *less friction, last longer,* and *require less power.* But the saving in *oil* is a consideration of no trifling importance. We have been informed by persons who have used them, that by thus not allowing the oil to run to waste, the saving amounts to no less than seven-eighths; that a pint with the lubricator will go as far as a gallon without it. We have even heard that the patentee guarantees this saving in oil, and further, that the reduction of friction by the use of these vessels, shall be equal to an increase of from a sixth to an eighth of the power employed. They are in use at the Royal Dock Yards, of Portsmouth and Woolwich, and are being introduced into the Government Steam Packets. As there can be no question of their great utility, we shall be happy to see them universally adopted.

COMPENSATION PENDULUM.

By Mr. Adam Reid, of Green End, Woolwich.

In the year 1818 a reward was given to Mr. Reid, for a compensation pendulum, in which the bob rested on a hollow cylinder of zinc, through which the rounded end *b c* of the steel pendulum rod A passed, the zinc itself being supported by the nut *e* at the end of the rod. As therefore, the rod lengthened by heat, carrying the bob downward, so the upward expansion of the zinc raised the bob; and if the relative lengths of the steel and zinc were so proportioned that the amount of their expansions was equal, it is evident that the compensation above described would be perfect. But it is extremely difficult to effect this accurate proportioning of the lengths of the two metals. The length of the zinc, at first must be such, that its rate of expansion shall be in excess, and it must be cautiously reduced by repeated trials, till the requisite accuracy is attained; this however is not done, except at a considerable expense of time and attention, to avoid which Mr. Reid has introduced the following modification. He forms a hollow screw, in the cross bar *f* of the bob *g*, and an external screw of the same rake on the end of the zinc cylinder *d*; this latter is purposely made too long for due compensation, but its effective length may be commodiously and accurately reduced to what is required, by screwing it up as represented in the figure. But after this has been done, supposing the nut *e* to have remained stationary, it is evident that the extent of gravity of the pendulum itself, will have been lowered by the bob descending, exactly as much as the upper end of the cylinder has advanced through the hole in the cross bar *f*; an adjustment for time is therefore required after that for compensation has been effected, which is done in the usual way, by screwing up the nut *e*. This latter compensation, however, will not be required, if the rakes of the screws *f* and *c* are proportionate to each other, as the weight of the bob alone is the sum of the weights of the bob, the zinc cylinder, and the nut. Thus, if the former weight be assumed as ten, and the latter as eleven, the screw at *f* must have ten threads, in the same length that the screw at *c* has eleven threads. Care must be taken in screwing the cylinder of zinc up or down, to place the finger and thumb at the same time on the nut, so that the two may turn together; or the nut may be fastened to the cylinder.



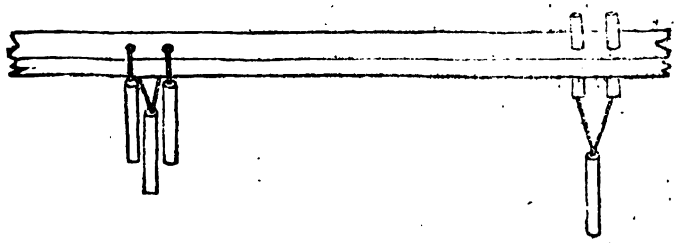
The sum of Five Guineas was presented to Mr. Adam Reid, for this invention, by the Society of Arts, a model of which is placed in its Repository.—*Trans Soc. of Arts.*

METHOD OF SECURING AND PRESERVING ROWING PINS IN BOATS.

To the Editor of the Quarterly Journal of Science.

DEAR SIR,

To remove a petty inconvenience of hourly occurrence, by some simple contrivance, is often productive of a greater mass of advantage than an invention of greater splendour, and of apparently more extensive utility.



In the accompanying drawing you have a plan for preserving that indispensable requisite in a boat, the towels or rowing pins; the loss of which is not only very teasing, but often productive of serious inconveniences, while the practice of stealing them from each other forms a constant source of petty depredations, leading to perpetual quarrels among seamen in harbours. He who has been detained the better part of a day in the island of Sky, till half-a-dozen of these pins could be procured, well knows how to value that trifle, the neglect of which has caused the loss of his voyage, and might have led to that of his boat and his life also.

Fixed towels cannot well be used when boats are to be hoisted in alongside, as they are subject to be broken, and they are often inconvenient in getting in water casks, as well as in many other cases. Hence, pins capable of being unshipped are preferable. These are frequently lost, and the want is not always discovered till it cannot be replaced; or else it is not replaced without loss of that time which is often so valuable at sea. Very often also the delay of even a minute is rendered inconvenient or even dangerous; when the boat is dragging alongside by the painter in a heavy sea, and the vessel is either drifting or standing on.

The drawing requires little explanation. By pulling at the lower pin the two upper are fixed at once, and on being unshipped they hang secure from loss; while the lower one serves as a spare towel should any be broken. As not one boat in 20,000 is provided with this invention, which is indeed scarcely known, it will not perhaps, be found undeserving a place in your Journal. J. M.

LONDON MECHANICS' INSTITUTION.

At the suggestion of a very respectable correspondent, who is about proposing the establishment of a literary and scientific institution in a provincial town, we have undertaken to give an outline of the arrangements made at the London Mechanics' Institution, which, it is presumed, will not only form an excellent model in the construction of the one proposed, but serve as a good foundation whereon others may be erected in future, making such variations and improvements in the superstructure as may best adapt them to their peculiar circumstances or localities.

Before, however, we commence this task, it may not be uninteresting to state, that the site of the present building was formerly the property of the Knights Templars, where they had a residence. From them it passed into the hands of the unfortunate Earl of Southampton, who died in it in 1550; and subsequently, into those of the Russel, the Percy, and the Montague families. In 1723 it belonged to the Duke of Manchester; and in 1727 it was assigned by several joint proprietors to the ancestors of the present proprietor, the Earl of Radnor. In 1740 a lease was granted to Edward Bootle, for a term of 230 years, after the granting of which the present premises were built. The lease was subsequently assigned to several members of the Bootle family; and was afterwards sold by Richard Wilbraham Bootle to William Cockle, Esq., who sold them to Edward Bigg, who left them by will to Edward Smith Bigg. The last-mentioned gentleman granted them on lease to *the Trustees of the London Mechanics' Institution,* for the whole remaining term of the lease, being 146 years from the 1st September, 1824, at a rent of £229. per annum.

In the frontispiece to the third volume of the first series of this work, we have given a copper-plate engraving, representing an external perspective view of this building, which is situated at the corner of Southampton Buildings, Chancery Lane, and adjoining to the garden of Staple Inn. That view includes one of the sides of the Lecture Theatre, added to the old building, the first stone of which was laid by Dr. Birkbeck, the president and munificent patron of the Institution, on the 2nd of December, 1824, and was completed and opened for use on the 8th of July, 1825. Since that period, the unwearied zeal of its founders has borne it successfully through every object that opposed its continuance, and the useful classes, generally, may now avail themselves of the very numerous advantages which the highly-improved state of the Institution holds out to them.

We shall now proceed to explain the appropriation of the several rooms which the building contains, by reference to some plans which we have taken and had engraved for the purpose.

Explanation of Letters of Reference to Fig. 1, (on the other side) which exhibits a plan of the ground floor of the whole building.

D. Are the Doors in front of House in Southampton Row.

O. Office.

H. Hall, and principal Staircase.

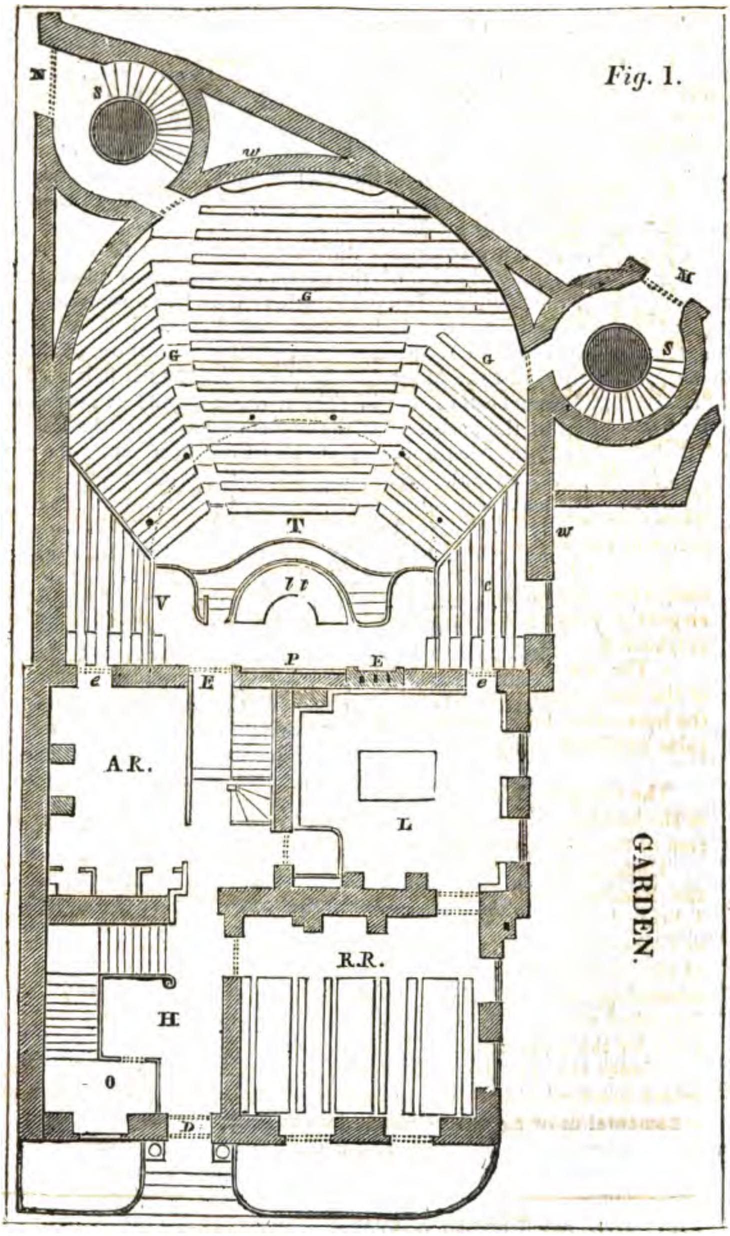


Fig. 1.
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GARDEN.
R.R.
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D

R R. Reading Room, for the accommodation of the members, supplied with all the periodical journals and reviews, and where all the books in the library may be perused.

L. The Library, containing upwards of 3000 volumes, including almost every work of reputation on science and literature, which may either be consulted in the reading room, or taken home by the members.

A R. Anti-Room to Theatre.

E. Principal Entrance from the House into Theatre.

e e. Side Entrances into Theatre.

T. The Theatre, bounded by a wall *w w w* of a horse-shoe form.

G G G. Are the seats appropriated to the members in general.

C. Are those allotted exclusively to members of the Committee, and V. those for the accommodation of Honorary Members and Visitors.

N. Is the entrance into the Theatre from Northumberland Court, and M, is that leading from Middle Row, Holborn.

s s. Two circular spiral stair-cases, which proceed from the casement to the gallery.

l t. Is the Lecturers' Table, behind which at P is a large frame for the exhibition of Plans, Diagrams, Charts, Drawings, &c. and when these are made into transparencies, they are illuminated by a series of gas jets arranged behind the frame.

F. Is a Furnace employed in the chemical lectures. This furnace when not in use, is closed by two folding doors, which are elegantly painted to correspond with the folding doors of the entrance E.

• The six circular spots arranged in a semi-circle shew the site of the iron pillars that support the principal gallery, which is also of the horse-shoe form, as shewn by the curved dotted line of that figure, (also exhibited in fig. 2.*)

The foregoing plan, although only descriptive of the *ground-floor* of the building, will enable us to explain very clearly the appropriation of the rooms and offices of the basement underneath it.

Underneath the Hall H is a kitchen and store-room : underneath the Reading-Room R R, are the Porters Rooms' : underneath the Library L, is the Laboratory of the same area, containing furnaces and other requisites for chemical investigations. In this room a class of the members meet weekly for mutual instruction in chemistry, mineralogy, &c. Adjoining to the Laboratory is a small work-shop furnished with an excellent turning lathe, work bench, and various tools for the construction and repair of apparatus.

Under the Theatre is an extensive class-room, lighted by gas, where practical geometry, perspective, architectural, mechanical and ornamental drawing, are regularly taught.

(*To be continued.*)

* This will be given in our next number.

PATENT SILK WINDING MACHINERY,

By H. R. Fanshaw, of the Silk Mills, Stratford, Essex.

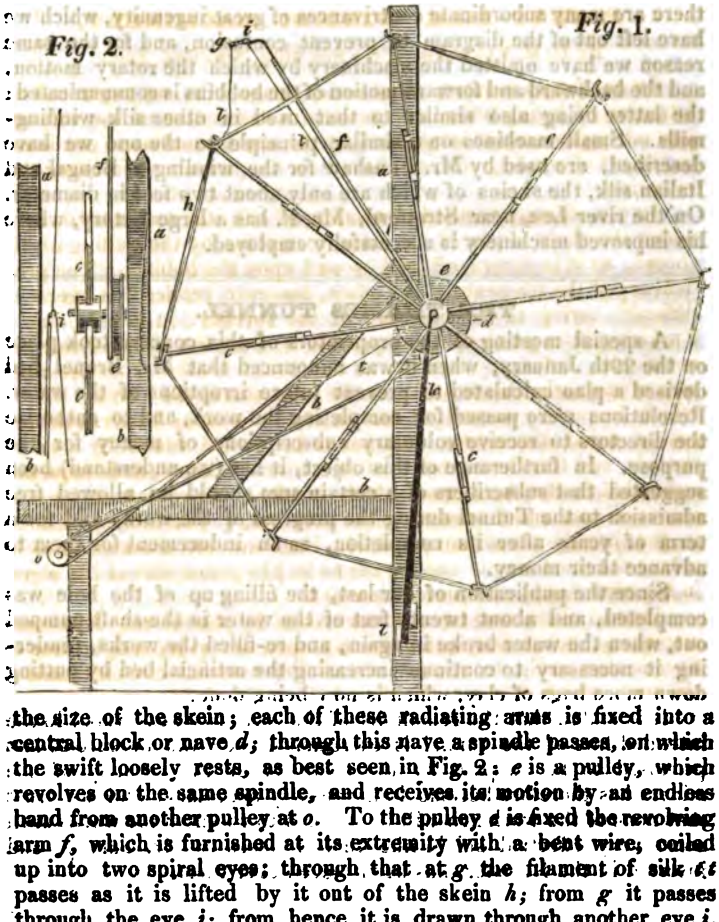
In our fourth volume, (first series) page 212, we expressed our intention of laying before our readers a description of the very important improvements introduced by the above-mentioned gentleman in the art of winding silk, and have now the pleasure of fulfilling that intention.

In the ordinary method of winding off silk, *the reel* or swift, upon which the skein is placed, is made to *revolve* by the pulling of the thread, as it is drawn off and wound upon the bobbin. The great delicacy of the filaments of silk often, however, render this operation difficult, owing to the breaking of the threads: in the winding of Turkish silk in particular, the process is, from the circumstance just mentioned, extremely tedious, as the thread breaks at almost every turn of the reel: this is owing to the great size of the Turkish skeins, which frequently exceed 24 feet in circumference; thus requiring a reel of equal dimensions, that has to be turned round by a single thread; and this thread being of an uneven thickness, and frequently entangled in the skein, unavoidably breaks. To obviate so great an inconvenience and detriment to the material, (by an infinity of knots in the thread) the attention of Mr. Fanshaw was directed, and by means the most simple and ingenious he has accomplished his object in the most happy and perfect manner.

Instead of the reel being turned round by the filament it remains stationary, but is suspended loosely upon its axis; a light arm or flyer is then made to revolve round the external circumference of the reel, which *lifts* out the thread from the skein, more smoothly and delicately than it could be performed by the finger, conducts it to the centre of motion, and from thence to the bobbin upon which it is wound. By this contrivance the thread requires but little more strength than is sufficient to sustain itself, instead of having to drag round a great machine; and it follows that a much finer thread may be wound off by such apparatus than by those of the common construction. The first conception of this contrivance was a fortunate one, but we feel assured, from the arrangements made to perfect its execution, that greater mechanical talents have been exercised than are usually met with.

Our limits do not at present permit us to give all the details of this valuable machinery, we shall therefore confine ourselves chiefly to explaining the principal or most important parts, as represented by the annexed diagram.

Fig. 1 gives a side elevation, and Fig. 2 a front elevation of a portion of Fig. 1; the same letters in each referring to similar parts. *a b* is a frame, containing a swift, &c. of which there may be conceived to be a hundred or more in a row, one behind the other, as viewed in Fig. 1, all turned by the same shaft: the diameter of the swift may be considered as 8 feet, for Turkey silk, but the arms *c c* are made to elongate or shorten by the slides shown in the middle, so that the swift may be expanded or contracted at pleasure to suit



the size of the skein; each of these radiating arms is fixed into a central block or nave *d*; through this nave a spindle passes, on which the swift loosely rests, as best seen in Fig. 2: *e* is a pulley, which revolves on the same spindle, and receives its motion by an endless band from another pulley at *o*. To the pulley *e* is fixed the revolving arm *f*, which is furnished at its extremity with a bent wire, coiled up into two spiral eyes; through that at *g* the filament of silk *tt* passes as it is lifted by it out of the skein *h*; from *g* it passes through the eye *i*; from hence it is drawn through another eye *i*, to the central eye *k*, (Fig. 2,) and through the last mentioned, on to a bobbin fixed on the same shaft as the pulley *o*. The situation of the eye *k* opposite the centre of the axis of the swift, it will be observed is indispensable to the winding off of the thread; it is fixed to the end of a moveable rod which has a joint at *l*, that permits it at pleasure to be drawn forward beyond the range of the swift, for the girl in attendance to repair the thread should it be broken. The latter circumstance however rarely occurs, by these improved arrangements, and the trembling motion of the bent wire at the extremity of the revolving flyer greatly assists in relieving the silk from entanglement.

The revolving flyer is the principal feature in Mr. Fanshaw's machine, and is in itself a very beautiful and no less useful invention;

there are many subordinate contrivances of great ingenuity, which we have left out of the diagram to prevent confusion, and for the same reason we have omitted the machinery by which the rotary motion, and the backward and forward motion of the bobbins is communicated; the latter being also similar to that used in other silk winding-mills. Small machines on a similar principle to the one we have described, are used by Mr. Fanshaw for the winding of Bengal and Italian silk, the skeins of which are only about two feet in diameter. On the river Lee, near Stratford, Mr. F. has a large factory, where his improved machinery is successfully employed.

THE THAMES TUNNEL.

A special meeting of the proprietors of this concern took place on the 29th January, when it was announced that Mr. Brunel had devised a plan calculated to prevent future irruptions of the water. Resolutions were passed for completing the work, and to authorize the directors to receive voluntary subscriptions of money for the purpose. In furtherance of this object, it has (we understand) been suggested that subscribers of a certain sum should be allowed free admission to the Tunnel during the progress of the work, and for a term of years after its completion, as an inducement for them to advance their money.

Since the publication of our last, the filling up of the hole was completed, and about twenty feet of the water in the shaft pumped out, when the water broke in again, and re-filled the works, rendering it necessary to continue increasing the artificial bed by putting down more bags of clay, which is now being done.

It is stated that the remainder of the earth to be excavated in the intended line of the tunnel is extremely loose; the measure at last proposed to be adopted by the company for the security of the miners has therefore become indispensably necessary, and we trust that none of the workmen will be induced to re-enter the works until some very effectual shield like that proposed by Mr. Garvey, and inserted in the Register, has been placed over them.

MECHANICAL SCIENCE OF THE MECHANICS' MAGAZINE.

From the long silence of the Mechanics' Magazine, and the London Journal, (the two remaining defenders of perpetual motion,) we had thought that they had both shared the fate of their unfortunate ally, the Technological Repository. The editor of the Mechanics' Magazine is, however, by some magical power resuscitated, and under the assumed name and garb of "Common Sense," has returned to the attack. No doubt he thinks or hopes, that his readers have by this time quite forgotten his assertion, that "a man by turning a roller with a handle can, for a continuance of six hours at a time, only raise 550 lbs. through 10 feet in a minute; and that with all the additional

assistance afforded by the wheels and pinions of the common crane, it has not been the *practice* for the workmen at these (West India) Docks to realize much more than double that rate;" and that with Mr. Wright's machine "we have 701 lbs. for the weight raised by each man 10 feet per minute; *being nearly four times more than what a man can effect by a simple roller and handle, and twice as much as has been customary to accomplish with the common crane.*"*

Now, however, it is stated in a late number of the Mechanics' Magazine, (229, page 407,) that the Editor of the Register of Arts, in asserting "that no power can be gained but at the expense of velocity, is THEORETICALLY RIGHT," and the writer further states, that "if Mr. Wright's crane is so constructed as to move with less friction and resistance,† then may not this advantage be applied either in velocity or power, or both? Such, I think, is the case."

This writer's notions with respect to friction appear to correspond well with his ideas on the effective power of compound machines; for unless the friction in any machine diminishes with the increase of the parts acting on each other, he must be in error; as in Mr. Wright's crane there are no fewer than 14 places where friction is produced by moving parts acting on each other; whereas, in the common crane with a single wheel and pinion, like those used at the West India Docks, there are but 5 places where friction is generated by moving parts acting on each other. Verily, the man who can gain both power and speed, and also diminish friction by increasing the acting parts of a machine, is in a fair way of discovering the *perpetual motion*.

N. B.—Will this champion of Mr. Wright's funny contrivance for gaining power and speed, condescend to inform us why the experiment we suggested for making a *fair* trial of its real merits is not made?

Since writing the foregoing, we have seen another number of the Mechanics' Magazine, which contains a fresh attack upon us, for some observations that we made a long time ago upon a new patent for a very old contrivance, as the editor of the Mechanics' Magazine might have seen by consulting his own pages. The article is undeserving of an answer, as every reflecting man acquainted with hydraulic machines will at once perceive; it shall therefore have none from us: but we would seriously advise the Editor of the Mechanics' Magazine to profit by the maxim, "*those who live in glass houses should be the last to throw stones*"; as the return of a very few of the missiles showered upon us would reduce his tenement to atoms.

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* We have been accused by the editor of the Mechanics' Magazine, (No. 228,) of a wicked misrepresentation, in saying, that he had asserted that both *power* and *speed* may be gained by *increasing* the parts of a machine, when he states that he "never made any such assertion, nor said any thing that can bear such a construction." Now we only ask any one acquainted with the subject to read the above paragraph in the Mechanics' Magazine, and judge for himself whether he can attribute *any other meaning* to the editor's remarks.

† Quere—Does resistance here mean the weight to be raised?

SCIENTIFIC INSTITUTIONS.

ROYAL INSTITUTION.—The Friday evening meetings at this Institution commenced on the 25th January, when PROFESSOR BRANDE gave an account of *Vegetable Alkalies*, the active principle of the cinchona, quinine, &c.

In the Library were shown several elegant specimens of artificial flowers, composed entirely of the scales of fish from the Brazilian coast.

It was announced, that on Saturday, the 2nd of February, PROFESSOR BRANDE would commence his course of Lectures upon the *History and Properties of the Metals.*

LONDON MECHANICS' INSTITUTION.—DR. BIRKBECK'S Course of Lectures on the *Functions of the Human Body*, still occupy the Friday evenings of this Institution: and the Wednesday evenings are occupied by MR. HODGSKIN'S Course on the *Physiology of the Mind.*

RUSSELL INSTITUTION.—Monday, the 28th January, MR. SMART commenced a Course of Eight weekly Lectures on *Elocution*:—and on Wednesday, 30th January, MR. S. WESLEY delivered the first of a Course of Six weekly Lectures on *Music.*

QUESTION ON AIR-PUMPS.

To the Editor.

SIR,

Your reply to my question respecting the double-barrelled air-pump, does not exactly meet my question, at least as I intended it, I shall therefore endeavour to explain myself more clearly.

Let us suppose a single-barrelled air-pump connected with a receiver, and that the air in it is so rarefied that the power exerted is just sufficient to raise the piston; let there be also an arrangement for admitting as much air at each stroke as will maintain the air in the receiver, at the same degree of rarefaction; in this case it cannot be said that any mechanical power is wasted or lost by the single pump. Let the single pump be replaced by a double pump, and the air still maintained at the same degree of rarefaction, and very little more than half the force required by the single pump will now be found sufficient. If this statement is correct, (and I cannot detect any fallacy in it) we have here a gain of power and speed at the same time. If it is replied that the gain of power is to be attributed to the action of an additional power, viz. the pressure of the atmosphere, the thing remains still as paradoxical as before, since this atmospheric pressure is obtained by means of the mechanical force exerted.

I should be glad to see a full discussion of this subject in your interesting work: at present it really appears to me that power and speed may be gained by an arrangement on the principles suggested above, which might be usefully applied in many cases.

Yours, &c.

J. M.

London, 21st January, 1828.

INCREASED EFFICIENCY OF STEAM ENGINES IN CORNWALL.

To the Editor.

SIR,

THE statement inserted in a late number of the Register, of the increasing efficiency of certain engines at the mines in Cornwall, is highly interesting. It would, however, add much to that interest, if you would state how that increasing efficiency is occasioned; whether by modification in the machinery, or by working with a greater pressure on the piston, and availing of the expansive power of the steam. I have reason to believe that this principle has, latterly, been carried to a great extent in some of the Cornish engines; which will account, in a great degree, for their superior economy.*

On referring to Messrs. Lean's report for October, 1825, I observe, that the duty performed by the engine of 60-inch cylinders at Wheal Hope, is stated at 40,865,797 lbs. raised one foot with each bushel of coals, the load per square inch on the piston being 4·5 lbs. The reported increase in the same engine to 50, 54, and 55 millions of pounds, is certainly very important. I further remark, that in the monthly report before me, (October, 1825,) there is only one engine registered, whose performance exceeds that at Wheal Hope, viz. in Woolf's engine, of 70-inch cylinder, at Wheal Sparnon, where the duty is stated at 43,865,847 lbs. with a load on the piston of 8·7 lbs. per square inch.

I have heard of the recent performance of an engine in Cornwall, greater even than that stated in the Register, as effected at Wheal Town, but own myself somewhat of a sceptic on the subject. That during the next five years much will be done in economizing the working of steam engines, arising out of some of the speculations now afloat for that purpose, I have, however, but little doubt; nor can I help believing, that the steam engine, wonderful as it now is as an object of art, will, within a short period comparatively, be rendered much more generally available to the various wants of mankind, by its superior safety, simplicity, and economy.

Your obedient Servant,

12*th Jan.* 1828. P.

Steam Carriages.

BURSTALL AND HILL'S STEAM CARRIAGE.—The large model of this machine which was described by us in our 19th Number, and of which many of the details were previously given in our 2nd Number, is now being publicly exhibited in the great room of the British

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* The statement alluded to was furnished to us by an anonymous correspondent; we will, however, endeavour to obtain the information sought for by our correspondent P.—EDITOR.

Coffee House, Cockspur Street, Haymarket. It is every day set to work for several hours together, and its performance is the theme of general admiration. We shall shortly have occasion to return to this interesting subject.

GURNEY'S STEAM CARRIAGE.—A correspondent writes us that he was present during that trial of this carriage, which was stated in the Newspapers to have then run at the rate of 14 miles an hour, and that it really did so for a short time, but it was *down hill!* The cause is therefore rather to be attributed to the force of *gravitation*, than to that of steam.

LIST OF PATENTS.

Sealed 1828.

LIQUOR COCKS.—To Wm. Gossage, of Leamington Priors, Warwick, for improvements in liquor-cocks To be enrolled 2nd July.

IRON SMELTING. To T. Botfield, of Hopton-court, Salop, for improvements in making of iron. To be enrolled by 2nd March.

DYEING.—To J. Hall, Jun., of Ordsall, near Manchester, for improvements in dyeing by machinery. To be enrolled by 2nd March.

DRESSING CLOTH.—To J. C. Daniel, of Stoke, Wilts, for improvements in the dressing of cloths. To be enrolled by 2nd July.

LACE MAKING.—To W. Morley, of Nottingham, for improvements in machinery for making lace. To be enrolled by 9th July.

FRUIT GROWING.—To the Rev. James A. H. Grubbe, of Stanton Saint Bernard, Wilts, "for his having invented a transmitting heat wall, for the ripening of fruit." To be enrolled by 9th July. 6 months.

FURNACES.—To J. Gilbertson, of Hertford, for improvements in furnaces for the consuming of their smoke. To be enrolled by 15th March.

SHEARING CLOTH.—To Charles Hooper, of Marston Bigott, Somerset, for improved machinery for shearing woollen and other cloths. To be enrolled by 15th March.

STEAM ENGINES.—To John Evans, Jun., of Wallingford, Berks, for improvements on steam engines. To be enrolled by 15th July.

WATER PROOF HATS.—To Joseph Blades, of Clapham, Surry, for improvements in the water proof stiffening for hats. To be enrolled by 15th July.

INVALID CHAIR-BED.—To Wm. Newton, of Chancery Lane, for an improved surgical chair-bed, communicated by a foreigner residing abroad. To be enrolled by 15th July.

DRESSING CLOTH.—To G. D. Harris, of Stroud, Glocester, for improvements in dressing yarns, cloths, &c. To be enrolled by 15th July.

MASTS AND YARDS.—To J. F. Atlee, of Deptford, Kent, for improved bands or hoops for masts, yards, &c.—To be enrolled by 15th July.

REFRIGERATORS.—To W. E. Cochrane, of Regent Street, for improved apparatus for cooling. To be enrolled by 15th July.

HEAT.—To J. T. Beale, of Church Lane, Whitechapel, and G. R. Porter, of Old Broad Street, London, for a new mode of communicating heat for various purposes. To be enrolled 19th July.

HORSE SHOES.—To W. Percival, of Knightsbridge, Middlesex, for improvements in the construction and application of shoes to the feet of horses, without nails. To be enrolled by 19th July.

PROPELLING.—To G. Jackson, of St. Andrew, Dublin, for improvements in machinery for propelling vessels. To be enrolled by 19th July.

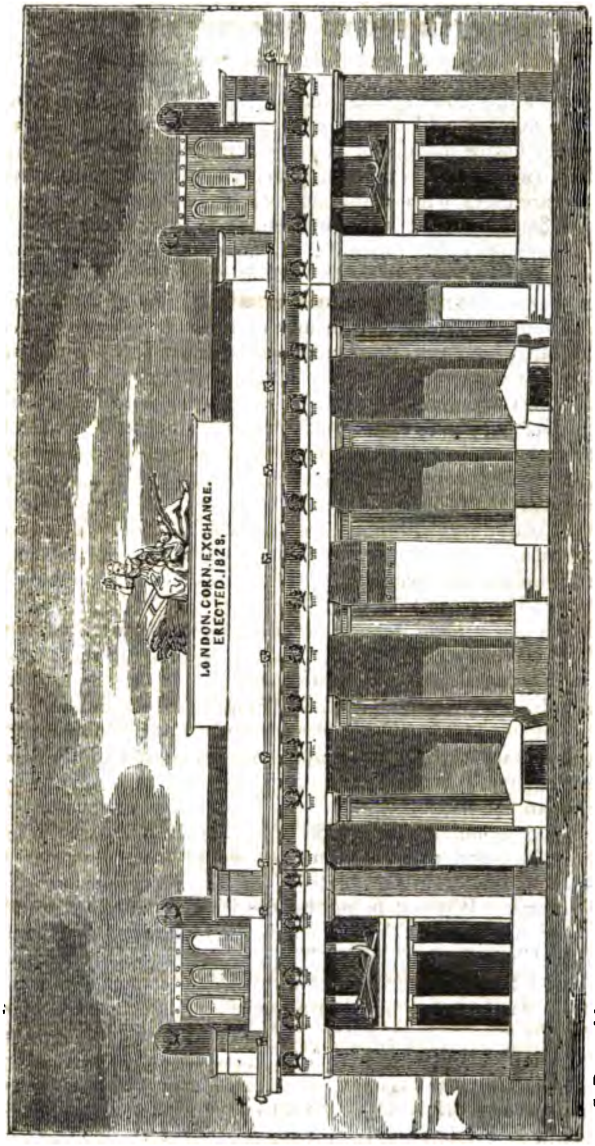
TO OUR READERS AND CORRESPONDENTS.

ERRATA.—We think it proper to notice, without delay, that (owing to indisposition) we did not see the proof of our last number, in consequence of which an omission was made at page 326,—to acknowledge that the article on "*A new Compensation Pendulum*," was extracted from the American Mechanics' Magazine.—At page 335, on "*Plating Iron*," the words "*from the same source*," referred to an article on *Mimic Gold*.

The discovery of H. R. is really very important, we shall take pleasure in publishing it, with all the details.

Mr. G——s's favour is not forgotten.

Correspondents will be replied to in our next.



C. Davy, delt. E. W. Holloway, sculp.

THE NEW LONDON CORN EXCHANGE IN MARK LANE.

ARCHITECTURAL DESCRIPTION OF THE NEW LONDON CORN EXCHANGE,

By Mr. C. Davy, Teacher of Architecture, London Mechanics' Institution.

Emulous as this country has lately appeared to rival Greece and Rome in the number and beauty of her edifices; in restoring and bringing under notice models of those sublime specimens of architectural skill, (which after a lapse of so many ages continue to furnish the modern architect with ample materials for study), a strange infatuation seems to pervade those who continue to have the direction of the improvements going forward; ill-chosen situations, and consequent loss of effect are repeatedly exhibited.

At the present time there are, comparatively, few of the remains of antiquity remarkable for the beauty of their design and general proportions, that have not been judiciously restored; but, unfortunately, they are scattered so widely apart, and (in some instances) are in such holes and corners, as to be almost difficult of discovery. But while imitating the Greeks and Romans in our buildings (as far as customs and climate will permit) the present state and appropriation of our Markets form a great contrast with the Forum or Agora of the ancients: the former of these remarks is peculiarly applicable to the New Corn Market represented on the other side. The architect, Mr. Smith, has, however, brought forward and carried the resources of his profession successfully into practice to adapt the building for a narrow and confined situation.

It consists of a central portion occupied by an insulated peristyle of six columns: the two extreme ends of the building are rectangular, and have thin corresponding antæ or parastatæ at the angles. The Greek Doric has been selected as the ordonnance of the building, and taken by itself, may be accounted of a chaste and beautiful character; the triglyphs, however, (by necessity) are omitted, and the Greek laurel wreaths have been substituted for them; had the triglyphs been introduced into the frieze, the width of the intercolumniation being more than the monotriglyph proportion, the metopes would have become too wide, and as a consequence, would have destroyed the main feature of the Doric entablature, whose proportions are of an arbitrary nature. Without being hypercritical I question whether the introduction of an entablature, having the characteristic features of that of the Choragic monument of Thrassylus, would not have been better adapted for the situation; and to which columns of a more slender form might have been introduced, and a portion of the architect's labour have been saved. This is, however, only a part of those difficulties which emanate from the introduction of the Greek style in this country, the acknowledged purity of which makes it a duty incumbent upon the architect not to vary from the path marked out by Ictinus and Callicrates: but when we find story piled on story, with a series of Greek columns following in succession, the minutiæ of the mouldings and ornaments (to which it is indebted in a great measure for its beauty) is lost entirely to the view; and unless a

Greek design is of colossal dimensions it must very frequently fail in the purposes for which it is applied. On the contrary, if it be reduced in size, the surrounding buildings will then have the tendency to detract from its grandeur; for this reason, the present building appears comparatively insignificant by the side of its towering companion, the Old Exchange.* The remaining part of this building needs little to be said of it. An examination of the accompanying drawing will afford ample evidence that it is a tasteful and classic production. The open arches by which the wings are surmounted will have a beautiful effect with the light playing through them; this forms a very pleasing feature, and much accords with the style of building introduced by Mr. Soane. The central part of the building is adorned by a groupe, representing Labor crowned by Ceres; and over the windows of the Coffee and Sale Rooms, are appropriate emblematical groupes of Agricultural Implements.

The corn (as in other markets) is sold here by the sample; and the basement of the edifice is occupied by spacious wine stores. The cost of the building is stated to be upwards of £60,000.

PATENT DISTILLING APPARATUS,

By Mr. James Frazer, of Houndsditch, London.—*Enrolled May*, 1826.

The object of the patentee of this apparatus is the economising of fuel, and the production of a pure spirit, by a peculiar arrangement of the vessels employed, that shall at the same time be in perfect accordance with the existing excise laws.

The *wash* still, instead of being exposed to "naked fire," is immersed in boiling water; the vapour from the former enters the *low-wine* still, where it is condensed; the wine thus abstracts the heat from the wash, becomes itself vapourized, and is conducted into a refrigeratory; the first and second distillations are in this manner conducted together by a continuous process, which will be best understood by reference to the annexed diagram, that shews the apparatus for the most part in section.

a is a supposed steam engine boiler, or other similar vessel, the heat from which boils the wash (or low wine) in the still *b*; to prevent the liquid from boiling over into the condenser the patentee forms the neck of the shape shewn at *i*, from hence the vapour passes through a steam tight case *e*, immersed in a reservoir *c* containing either wash or the product of the first distillation, where it becomes

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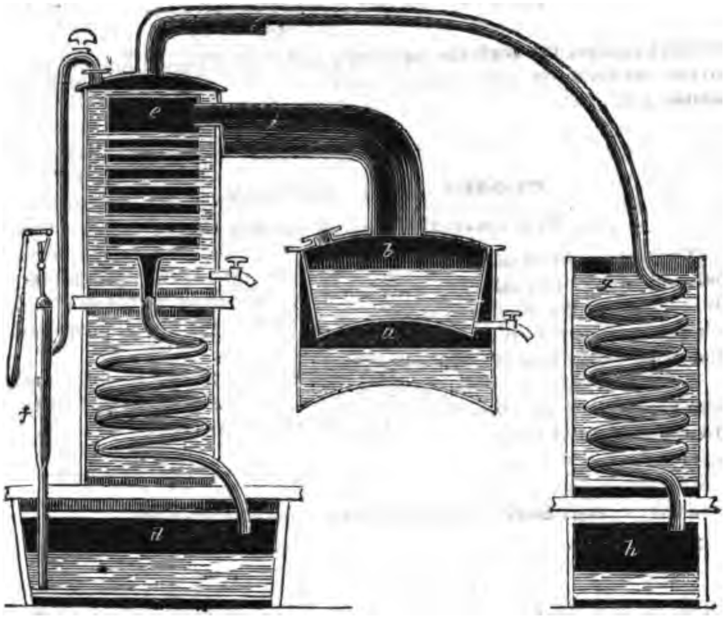
* It will be seen by the New Post-Office, in St. Martin's-le-grand, that a lofty Greek design with columns of one height, the entablature is sufficiently large to introduce windows in the side of the building, which has been censured; it was a difficulty the architect could not possibly overcome, which again shows that this style, *from its purity*, is insufficient for *this country*,—we want apartments for comfort, and edifices for business models from temples, therefore, with all the architect's skill, will be ever open to great difficulties, from the natural consequence of Grecian architecture demanding such strictness of proportion.



partly condensed; the vapour and condensed liquid then descend through the worm beneath, wherein the condensation is completed, and the liquid cooled, which then runs into the closed recipient *d* underneath. This recipient *d* therefore contains the weak spirit of the first distillation, called low wines; to re-distil which product, it is raised by the pump *f* and discharged into the reservoir *c*, which is, in effect, the low wine still; the liquid in this vessel, as before mentioned, is vapourized by the heat of the vapour from the wash still, passing through it; is afterwards condensed in the refrigeratory *g*, and finally received in the closed vessel *h*, where the operation is completed.

The foregoing is, we trust, sufficiently explanatory of the apparatus, except as relates to the case *c*, the construction of which requires further elucidation. It may be considered as a square steam-tight box of thin metal, through two of the opposite sides of which, and horizontally across the interior, are fixed numerous tubes, open at each end; through these tubes the low wine in *c* flows, and thus two fluids are exposed to the influence of the temperature of each other by the very extended surfaces of the intervening medium of thin plates of metal which compose the tubular box, which, while it partly condenses the vapour of the wash, heats the more volatile liquid of the wine to vaporization.—This contrivance and the arrangement of the vessels generally is, we think, judicious, and well calculated to perform the operations of distilling spirit with economy, and at the same time

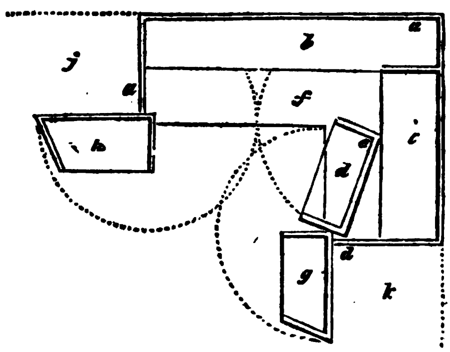
in strict conformity with the arbitrary and absurd regulations of the excise, which operate as a severe check to most improvements in this *sublime* art.

CLOSET FOR PAPERS.

By W. J. Charlton, Esq. of the War Office.

The press presents externally two doors, each carrying a set of shelves, which open outward with the door, and is thus very accessible. Facing the moveable shelves is a similar set of fixed ones, besides another case turning outward on a vertical pinion, and thus capable of being brought into view at pleasure.

By this arrangement the corners of a room afford much more accommodation than when fitted up in the ordinary way. Libraries, cabinets of natural history, merchants' papers, &c. which from their constant tendency to accumulate, often become inconveniently bulky for stowage in private houses, might be considerably reduced in the space they occupy by the adoption of this arrangement.



Reference to the Diagram.—*a a a* a horizontal section or plan of the closet; *b b* and *c c* two sets of shelves, half the depth of the closet; *d* a smaller moveable set, hinged or jointed at *e*, this shuts into the space *f*, and then the set *g* will shut into the place now occupied by *d*; *h* a third set, shutting into the place *i*. It is evident that when *g* is open, access is had both to it and to the shelves *c c*: and by opening or turning back *d* and *h*, as in the figure, access is had both to them and to the shelves *b b*. The spaces *j* and *k* are supposed to be occupied by other cases of furniture; the height and number of shelves are of course arbitrary.

The Silver Vulcan Medal was presented to Mr. Charlton, by the Society of Arts, for a communication of this invention, a model of which is placed in its Repository.—*Trans Soc. of Arts.*

IMPROVED MICROSCOPES WITH SAPPHIRE LENSES,

By Mr. A. Pritchard, of 18, Picket Street, Strand.

We noticed, at page 184 of the present volume, some important improvements which had been made by Mr. Pritchard, in forming microscope lenses of *diamond,* in lieu of the ordinary material, glass. Since that period Mr. P. has devoted himself with a zeal and perseverance, worthy of a true lover of science, to the discovery of some substance which should possess the same great practical advantages as diamond, and at an expense not much beyond that commonly used. After experimenting upon a great variety of the precious stones, some of which possessed the power of producing two images or representations of a single object, differently magnified, Mr. P. at length obtained in sapphire the long-sought object of his wishes, and a real desideratum in the construction of those instruments by which the wonders of the minutiæ of nature are laid open to our view. This ingenious artist has now executed several plano and double-convex lenses of sapphire, having different magnifying powers, from the $\frac{1}{8}$th to the $\frac{1}{100}$th of an inch focus. These microscopes are nearly aplanatic by themselves, for the coloured fringes around the objects, in ordinary instruments, are not appreciable to the observer in the sapphire microscopes; at the same time the distortion of the object is considerably less, and their magnifying powers, compared to those of glass of similar figure, is as 250 times of the former to 150 times of the latter; thus we are afforded, at a moderate expense, a better opportunity of distinguishing the real structure and form of objects under our examination.

Another considerable improvement in the mounting of lenses has likewise been made by Mr. Pritchard, whereby the danger of loosing them when required to be cleaned is entirely obviated; and at the same time a facility is afforded of removing them from one setting to another, which is a great convenience in making researches. From the superior hardness of the sapphire lenses over those of glass, they are burnished into a circular plate of brass, which also allows them to be mounted in such a manner as to obtain for the observer a very extended field of view. When the sapphire is applied as the object lens of a compound microscope, (even of the common sort) it materially improves the instrument, so that most of the test objects can be distinctly brought out by them in an agreeable manner.

FACE GUARD FOR FURNACE-WORKERS.

By Mr. J. Callaghan, of Carlisle Lane, Lambeth.

This guard is intended to preserve the face, and particularly the eyes of smiths, founders, stokers, and others, from being injured either by the heat of the furnace, or of red hot or melted metal, or of fragments of metals dispersed by the hammer. The guard is of

two forms, either a *veil* of iron-wire gauze of a curved form, and fastened by a hinge to the front part of the hat; or a *mask*, more or less complete, with the eye-holes covered with wire gauze.

There is not much novelty in the invention itself, but there is in its application, to persons exposed to the radiant heat of furnaces, whose eyes, it is well known, often become much injured thereby. The great utility of it for these purposes has been testified by a number of persons who have recently adopted their use, and have expressed their surprise at the trifling heat which they in consequence felt upon their faces.

The Society of Arts have very properly rewarded Mr. Callaghan for its introduction, the publication of which in its work, and the notice of it in this and other journals, will, we hope, lead to its general adoption.

PATENT DAMAJAVAG,

(A SUBSTITUTE FOR GALL NUTS.)

By Charles Louis Giroud, of Queen Street, Soho, London.—*Enrolled January*, 1826.

Our readers will, no doubt, be surprised to learn that a patent has been taken out for an extract of the chesnut tree, to be employed as a substitute for gall-nuts, since it must be well known to every tanner, and every dyer in the kingdom, possessing either experience or chemical information, that the chesnut tree contains very similar properties to those of the oak—or gall-nuts; and the only reason why the latter maintains a preference in the arts, is, that its greatly superior richness in tannin and gallic acid, renders it the most economical. In the patentee's method of preparing his *damajavag* there may possibly be found something worthy the attention of the practical man; accordingly we give it as follows.—

The external shell of the chesnut, or the wood itself, is to be broken or cut into small pieces, and soaked in double its weight of water for twelve hours, then boiled for three or four hours, when the liquid is to be drawn off, and filtered through a cloth or sieve to separate the fibrous matter. The liquid extract is now to be evaporated by returning it into the boiler, and the ebullition is to be renewed and continued until the extract becomes of the consistency of paste; after this it is to be cut into cakes, and dried in an oven, for sale, or at once applied to the various purposes in the arts, in lieu of gall-nuts. One hundred pounds of chesnut shells will thus produce about eight pounds of *damajavag*.

The sap of the chesnut tree contains similar properties to the wood and the nut shell, but combined with a greater portion of mucilage: the trunks of the trees may be tapped, the sap collected, and an extract made from it by simple evaporation.

Damajavag makers must, however, be careful not to boil their chesnuts in an *iron* vessel, as they would thereby make *ink*, or at least black damajavag, instead of brown damajavag.

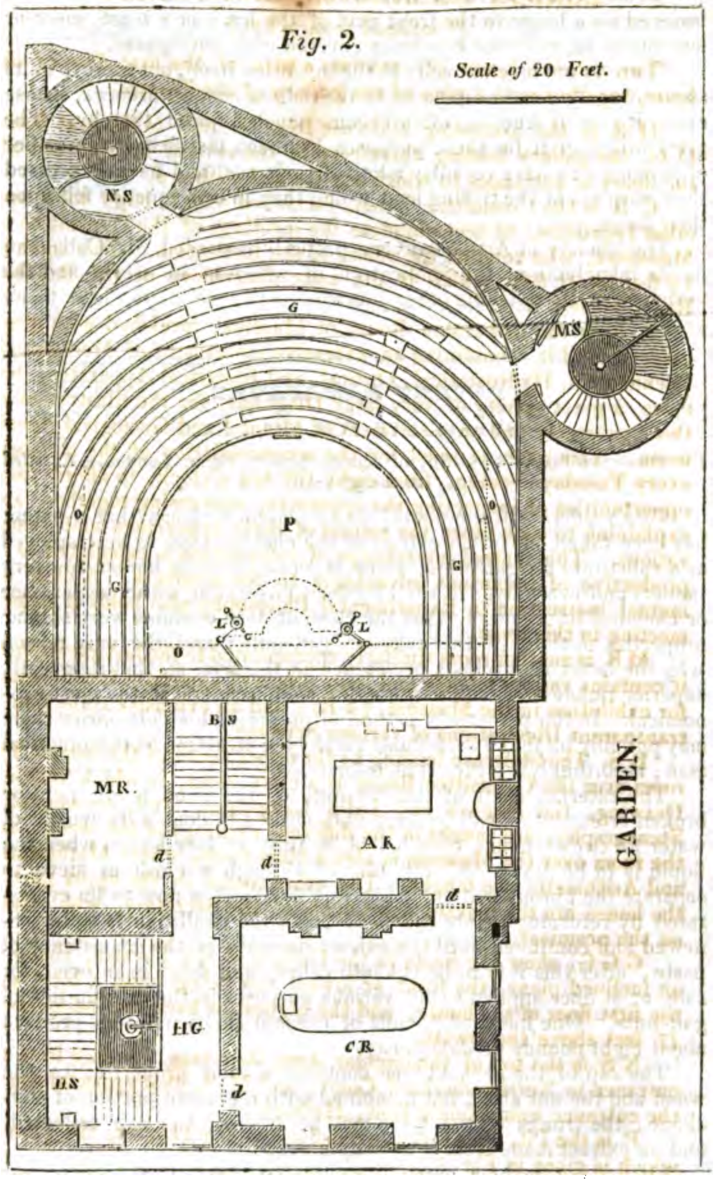


Fig. 2.

LONDON MECHANICS' INSTITUTION.

[Continued from p. 345.]

The annexed figure (2) exhibits a plan of the *first floor of the house*, together with a plan of the *gallery of the Theatre*.

H S is the ascending staircase from the hall to the first floor; H G, the gallery leading therefrom to the several apartments, all the doors or entrances to which are marked with a *d*.

C R is the Committee Room, furnished with a large table and other requisites, to accommodate the meetings of the Committee of Managers, who conduct the affairs of the Institution. This room is 19 feet by 21 feet, which is the same dimensions as the Reading Room beneath it.

A R is the Apparatus Room or Museum, furnished with glass cases around it, containing an extensive assortment of Mechanical, Pneumatical, Hydrostatical, Optical, and Electrical Apparatus; besides, a great variety of very large Diagrams, for the illustration of those subjects; and an assortment of Mineral and Geological Specimens. This room is open for the accommodation of the members every Tuesday evening, from eight till ten o'clock, to afford them opportunities of inspecting the apparatus, conversing together, and explaining to each other the results of their experience and observations. This mutual interchange of information is calculated to be productive of important advantages to the members. A class for mutual instruction in Experimental Philosophy also holds a weekly meeting in this room.

M R is another room similarly appropriated to the last-mentioned; it contains various models and large pieces of apparatus inconvenient for exhibition in the Museum, (A R); and an extensive collection of transparent Illustrations of various Sciences.

B S. The Staircase leading to the upper floors of the house. The room over the Committee Room is a class room, in which Writing, Drawing, the English and Latin Languages, and, occasionally, Stenography, are taught in the different evenings of the week: and the room over the Museum is also a class room, where Mathematics and Arithmetic are taught. The other rooms in the upper part of the house are the private apartments of the Secretary, who resides on the premises.

G G G, show the Seats in the Gallery of the Theatre, rising up an inclined plane, the front or lowest row being upon a level with the first floor of the house, and the highest or back row being about 17 feet above the lowest.

N S is the top of the circular stone stair-case, leading from the entrance in Northumberland Court; and M S, that appertaining to the entrance from Middle Row, Holborn.

P is the Pit, or rather ground-floor of the Theatre, the plan of which is given in Fig. 1.

L L are two jointed branches for gas-lights, each containing three burners, which can be moved in various positions to suit the objects to be illuminated.

The dotted lines, *o o o*, show the plan of a lofty rectangular gallery, even with the top of the semi-circular gallery G, from which there are two entrances at the extremities, and another in the middle at the back, from the second floor of the house.

X, in separate figure, is a scale of 20 feet.

(To be continued.)

WRIGHT'S CRANE AGAIN.

HAVING been not only abused by our contemporaries, but threatened by the patentee for giving a faithful description of this machine, together with an honest opinion of its real merits, we are not a little gratified to find that the enlightened and scientific editor of the Franklin Journal, (Dr. T. P. Jones, who may be regarded as the Dr. Birkbeck, of Philadelphia), entirely coincides with us in our sentiments. It would appear that the silly *announcement* of this invention in Newton's Journal, for *October*, had reached Philadelphia in time for Dr. Jones to make the following observations upon it, in the Franklin Journal for *December*. Let the sapient editors of the three perpetual motion Journals alluded to, and their *scientific* patron read this and blush at their folly.*

"NEW INVENTED CRANE."

"In the October No. of Newton's Journal, he has given the subjoined account of a new invented crane. We shall hereafter obtain further particulars of its construction, and we greatly err in our judgement, if its operation will be found to justify the expectations which the present publication is calculated to excite. We may find an improved instrument, in which the power† is more conveniently applied, than in those heretofore made; the friction‡ may be lessened; and the obstruction from the rigidity of cords,|| or other causes, may be in some measure obviated; but should the effective power of men be increased in the ratio represented, we must obtain some new mechanical power acting upon new 'laws of nature;' perpetual motion will no longer be an impossible problem, and we shall 'be condemned to study again our experimental philosophy,' and re-arrange all the machinery operated upon by the power of men." Vol. iv. N°. 6, p. 413.

After this follows Mr. Newton's nonsense, which of course our readers do not wish to see.

PATENT "GRAVITATING EXPRESSING FOUNTAIN,"

By Mr. W. SHALDERS, of Norwich.

WE have received from the above-mentioned patentee, the following amusing and elegant epistle, which, being in reply to our remarks upon his invention in a former number, we are bound in fairness to insert.

* In Mr. Gill's conduct in this matter there was not only extreme *folly*, but the most unaccountable malice, for he advised his employer to bring an action against us for damages.

† The power is applied in the same manner.
‡ The friction is more than doubled.
|| Chains employed both in Mr. Wright's and the common crane.

To the Editor.

Sir,—If you knocked me down yesterday, and I knock you down to-day, why should not we be good friends to-morrow. You merrily say in your Register of Arts, (Aug. 1826, p. 151,) that I am nearly bursted with joy for finding out a new very old thing; and I really think the thing is older than you expect,—as old Father Adam used a 'gravitating expressing fountain.' You will soon find yourself publicly charged with stupidity, for drawing my fountains in full play, when, according to the appearance of the connector, the expresser is not going up, down, or at rest. You'll see the rudeness is done away, and one frail connector has raised 75,000 barrels to ten feet; and another has raised the whole of the water for a large brewery to 28 feet high for almost one whole year, and continues in good action, and exceed your "good pumps" about 43 out of every 100. No engineer dare attempt to match them, although I allow them 50 per cent. more time to do the same work in.

Probably you will have the goodness to point out what machine you allude to, if you intend the hydrostatic bellows or moving bottom in Desaguliers, the powder-puff pump, or Benjamin Martin's patent,—*none of them are so much like my machine as I am like an elephant.*

Bank Place, Norwich, Your's truly,
Jan. 22, 1828. W. Shalders.

As we have certainly no penchant for disputing with an elephant on his powers of *gravitation* or *expression*, we shall leave the whole of the argument to be settled in the weekly Perpetual-motion Magazine to which it properly belongs. The threatened charge against us of "stupidity" has already appeared in that work, No. 231, and we are quite content to appear as there represented to the major part of its readers, knowing that *the well-informed portion* will agree with us not only upon the absurdity, but upon the *absolute impossibility* of raising by any machine whatever 43 per cent. more of water, with a given power, than by good pumps of the usual construction. The apposite observations of Dr. Jones upon Mr. Wright's Crane, quoted in the preceding page, are also strictly applicable to this *old invention with a new name*, which Mr. Shalders has, with great credit to himself, unconsciously invented over again.

ESSAYS ON LITHOGRAPHY. No. II.

(Continued from p. 335.)

Ink for Writing, or Drawing, on stone, or on Autographic Paper.

The principal operation in lithography, consists in impregnating a stone with fatty substances, very superficially, so that in consequence of the affinity which exists between these substances, and their power to repel water, the points or lines formed with them on stone shall be capable of retaining other such substances whenever they are brought in contact with them; while these same substances will be repelled by the moisture which the stone has imbibed in those parts they do not cover. Thus, when lines have been made on a stone with lithographic ink, or crayons, into the composition of which fatty bodies enter, and afterwards a roller charged with a fat or oily ink be passed over these stones, this ink will be deposited on the traces of the crayon, or of the lithographic ink, in a thin layer,

but sufficient to produce an impression; whilst it will not adhere to any parts of the stone, which are not impregnated with the fatty matter, and which, besides, are kept in a moist state. It is on this point that all the art of lithography depends; and it is only requisite therefore to discover, what substances by a proper combination can be made most suitable to answer the double purpose of producing a good drawing, and of receiving the ink, which is to form the impression. It will be apparent, that it is not a matter of indifference what kind of fatty substance be used, with which to form a drawing, or to trace a writing on the stone. These substances, in their natural state, if brought into contact with the stone, would diffuse themselves in every direction, and consequently, would not be capable of forming points or lines sufficiently fine, and well-defined, to give to a drawing the delicacy, precision, and harmony which it ought to have. It is necessary then to find a liquid composition, by which may be traced lines as clear and well-defined as those made on paper with Indian ink, and also a solid preparation, which will produce the same results as the common crayons used by artists. Hitherto, it has only been possible to effect this by forming a kind of soap, by the combination of fatty or resinous substances with an alkali. This soap when liquid does not spread as do grease and oils; and when in a solid state, it has such a degree of consistency, as to enable the artist to produce on stone all the effects of a drawing. But as soapy bodies are in general, soluble in water, and as the water with which it is necessary to moisten the stone, and consequently the drawing before applying the printing ink would destroy the drawing, by dissolving the soapy substance with which it was formed, it was necessary to find a means of reducing this soap to the state of a fatty body, insoluble in water. This is effected by spreading over the stone, and over the drawing, an acid, which by uniting with the alkali of the soap, reduces the latter to the state of grease. This operation, of which we shall say more hereafter, is called the *preparation*.

Lithographic ink if good, will be soluble in distilled water, and in all spring or river water, which is capable of perfectly dissolving common soap. It ought to flow freely from the pen, and not spread on the stone; it must also be capable of forming extremely fine lines, and should be very black, in order to render the work of the artist perfectly clear and distinct. The most essential quality, however, is that of imbedding itself firmly in the stone, so as to re-produce the most delicate touches of the drawing, and to afford a great number of impressions; in order to this, it is necessary that it should be capable of resisting the acid which is spread over it in the *preparation* so as not to have its fatty particles either removed or altered.

A host of recipes for making lithographic ink and crayons, have been published, and scattered both in Germany and in France. M. Senefelder in his work, gives eight receipts for making this drawing ink; yet assuredly, he has not published that which he considers the best. We think it superfluous to give these receipts, as it would only serve to create uncertainty in choosing from among them, and

especially as we consider them all more or less inferior to that which we have used for a long time, and with uniform success. It was after having tried a great number of compositions, that we gave the preference to the following.

Lithographic Ink.

Soap, from suet, or tallow,—dry............	30	drachms.
Mastic in tears.........................	30	do.
Soda of commerce......................	30	do.
Shellac in plates........................	150	do.
Fine lamp-black........................	12	do.

Soap made of tallow is to be preferred to that prepared from oil. But as soap is more or less hard according to its age, and the dryness of the situation in which it has been kept, it must not be used in exactly the above proportions with the other articles, without regard to its being either moist or dry. To obviate this source of error, and to obtain the exact proportions, the soap should be cut with a knife into thin slices, and exposed to the sun and air until it is perfectly dry; it is then to be put into a box lined with paper, and thus kept in a very dry place, until it is wanted for use. The best lamp-black, which is the product of the combustion of resin, should be used.

In order to melt these materials, a copper or cast metal skillet should be used, which should be furnished with a wooden handle; it will also be found convenient for it to have a lip on its edge, in order that the material may pass more readily into the moulds; particularly when crayons are to be made. The soap is first put into this vessel, which is then to be placed over a brisk fire in a chafing-dish; when this is well melted, the shellac is to be thrown in, which will fuse very readily; the soda is then to be added a little at a time, and after this the mastic, taking care to stir it with a spatula furnished with a wooden handle; lastly, the lamp-black is gradually put in, stirring it betwen every successive addition, until the mixture is complete. A very brisk fire is used, that the materials may be perfectly fused. The shellac is apt to swell up; it is therefore put into the skillet gradually, that it may not boil over. When all these materials are well incorporated, they are poured out on a plate of cast iron, made very warm, and rubbed over with oil, in order that the composition may be easily detached from it. Before the mass is poured upon the plate, ledges are formed around it, with pieces of wood, which serve to prevent the mass from running off, and enables us to preserve it of an equal thickness throughout; when these pieces are removed, the composition is to be cut into strips, by means of a knife, which should be guided by a rule: this must be done whilst the material is warm. Little sticks are thus formed, similar to those of Indian ink; it would, however, be more convenient to have moulds in which to pour the composition.

Many who have written on the subject of lithography, have recommended, not merely the melting, but the partial burning of the materials with which lithographic ink and crayons are to be com-

posed; but this is a bad method, since it is impossible in this way; always to obtain the same combinations; as some portion of the materials would thus be wholly destroyed. The means of obtaining good ink must depend on the nature of the materials, and upon their being duly proportioned to each other; and to accomplish these ends it is not necessary to have recourse to combustion.

The ink of which we are about to give the composition, is used either with a pen or a camel's hair pencil, for writings, dotted, and aquatinta drawings, those of a mixed character, or those intended as imitations of wood or other engravings.

(To be continued.)

SCIENTIFIC INSTITUTIONS.

LONDON MECHANICS' INSTITUTION.—On Friday, the 8th February, a special general meenting of the members was held to receive the special committee's report of the construction of the roof of the theatre. This meeting was adjourned, and concluded on the Wednesday following, the 13th, when it was announced to the members that on Friday, the 15th February, Mr. HEMMING would commence a course of Lectures on *Chemical Affinity and the Gasses*, DR. BIRKBECK having found it necessary to defer the delivery of the remaining part of his course on the *Functions of the Human Body*, for a few weeks.

It was also announced that on Wednesday, the 27th February, the President would introduce to the members, the original experiments of M. CLERMENT, on the *Issue of Highly Elastic Steam*, from small apertures in steam boilers, in a Lecture on that subject.

LONDON INSTITUTION.—A series of weekly evening meetings, of the members of this Institution, has, in imitation of those of the Royal Institution, been commenced.

To these meetings proprietors and their friends are admitted. Coffee and Tea is provided for the company in the Library, where it is intended to introduce all *New Scientific Inventions or Discoveries*, either by models or drawings. A short lecture or discourse, will likewise be delivered in the Theatre, on any *new Machinery, or Chemical, Literary, or other Novelty*, which may be deemed by the managers deserving of the attention of the Institution.

SOCIETY FOR THE ENCOURAGEMENT OF ARTS, MANUFACTURES, &c.—The meetings of this society have since the Christmas vacation been resumed on every Wednesday evening.

The Committee of Mechanics which meets every Thursday during the session, has recommended the Society to reward several useful improvements in their department: among these is an improved method of hanging revolving lamps, for signals to steam vessels, to prevent their running foul of each other.—A new method of preventing those impediments in watches arising from friction, which is effected by an ingenious application of pure plumbago instead of oil. Also, an improved detached watch escapement of considerable merit.

PATENT PROCESS FOR MAKING GAS FROM COTTON SEED.

By D. Olmstead, Esq. of New Haven, Connecticut.

The material which I employ, and the use of which I claim as my discovery, is the seed of the cotton plant; this after being dried or roasted, for the purpose of expelling from it the watery particles, I put into a retort, (or other recipient,) similar to those used for the making of gas from coal, tar, oil, or other substances, in which it is heated, to a degree sufficient to convert the oily matter into vapour; which vapour, before its escape from the recipient into the gasometer, is converted into a permanently elastic fluid, by being made to pass over an ignited metallic surface, in the way adopted in the making of gas from oil, or other substances.

In the conversion of the oily matter of the cotton seed into gas, I do not specify any particular form of apparatus, that already in use being sufficient for this purpose; but I do claim as my exclusive right, the employment of cotton seed for the production, by destructive distillation, of a permanently elastic and highly illuminating gas, the same being my invention and discovery, and not heretofore practised or known.—*Franklin Journal.*

Mechanics.

Perkins's Steam Cannon.—At the Lime Kilns, Greenwich, on Saturday last, a number of scientific gentlemen and engineer officers witnessed the trial of Perkins's Steam Cannon. A target was placed in a gravel pit, at a distance of 220 yards from the cannon, and the firing commenced at one o'clock and continued till half-past two, with trifling intermission. The balls were six-pounders, and were discharged at about 28 to 30 per minute, with a pressure of about 770 lbs. on the square inch. This pressure, Mr. Perkins states, is only half what the engine is capable of; but as the point blank range was so short a distance, the extent of power was not required.

Newly-invented Gun.—At a recent meeting of the Royal Society a gun was exhibited to the members, which is made to go off without a lock. The contrivance, to avoid this expensive appendage, is exceedingly simple; the trigger on being pulled lets fall a piece of spring-steel sharply upon the nipple or detonating cap, which is placed in a hole, communicating with the powder and shot, and of course the gun goes off immediately.—*Literary Review.*

Improvements in Chronometers.—A Swiss artist at Neufchatel has lately made a time-keeper, without employing any steel in its construction, except for the main spring, and pivots; by which means it is far less liable to the influence of magnetism, and is consequently a valuable improvement in astronomical clocks and chronometers. The clock, though placed in contact with a powerful magnet during a week, had not suffered the least derangement in its former rate of going.

Improvements in Printing.—The Times Newspaper is now printed by one of Mr. Applegath's patent machines, at the rate of 4,000 perfect sheets in an hour, or 70 per minute! The inking apparatus connected thereto is the invention of Mr. Cowper.

Useful Arts.

Mimic Gold.—The newspapers tell us that a gentleman at Leghorn has invented a new metallic compound, which he calls Artimomantico, resembling gold in colour. It is of the same weight as gold of 18 carats, and can be made like that of 24. At a manufactory at Bologna, buttons are made of it at a very cheap rate, which resemble the most highly-gilt buttons. The Artimomantico is soft and bends, and does not tarnish like other alloys resembling gold.

Aloes employed in Dyeing.—The bitter substance of aloes, dissolved in 800 parts of water at 59° Faht. (or in a smaller quantity if hot or boiling), will produce a beautiful purple colour, which is communicated to silk boiled in it, that neither soap, nor any acid but the nitric, will affect. The nitric acid too, merely changes it to a yellow, which may again be changed to purple by washing in water. Various shades may be given to the colour, by proper mordants. Wool is dyed of a fine black by the same process, and light has no influence on the colour. Tanned leather acquires also a purple colour, and cotton a rose colour; but the last will not resist soap. Dr. Liebeg is of opinion, that a permanent rose dye for silk, may be obtained from this substance.—*Annales de Chimie.*

Loss of Gold and Silver in Gilding and Plating.—The Edinburgh Journal states, that £50,000. worth of gold and silver are annually employed at Birmingham, in gilding and plating, and which is, therefore, for ever lost as bullion. This is a mistake, as it is a common practice with the Jews to buy gilt and plated goods, and even old pictures with gilt frames, for the sole purpose of abstracting the precious metals, which afterwards come into the market again in the form of bullion.

Meteorology.

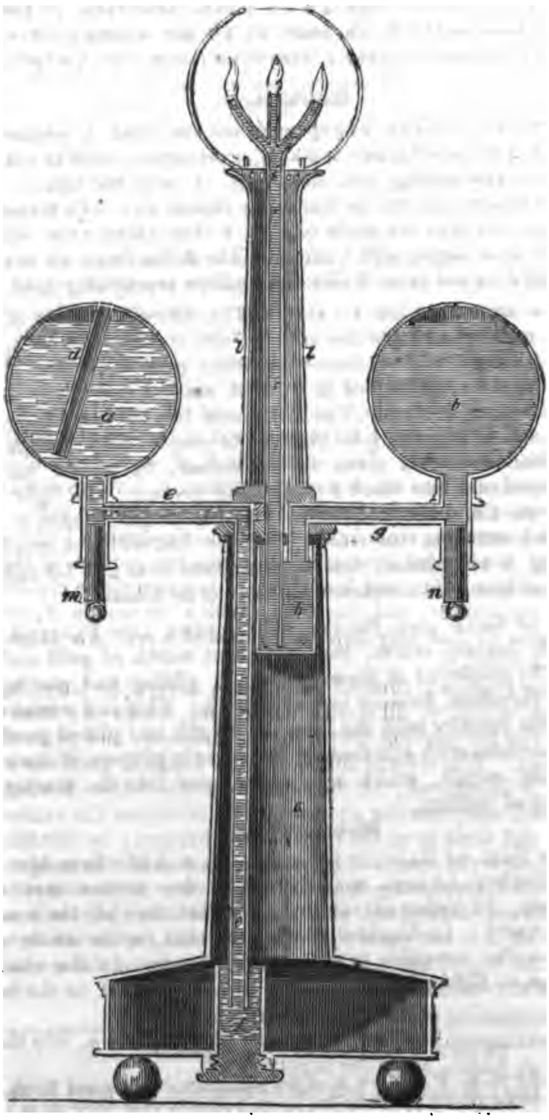
Great Fall of Rain at Bombay.—In a letter from Mr. Scott, Jun., of Bombay, he says, that during the first twelve days of the rainy season, 32 inches of rain fell, and that then all the roads became like rivers. In England, the average fall for the whole year is 32 inches,—the quantity which fell at Bombay in the course of twelve days,—*Edin. New Journal.*

TO OUR READERS AND CORRESPONDENTS.

The Letter of R. W———R is of too political a cast for our Work.

A Practical Essex Farmer has been received. The subjects mentioned are not published in any work; and a copy of the Specifications and Drawings from the Patent Office would cost more than the Machines themselves. The Editor will look at Coggin's Specification, and give some account of it at the earliest opportunity.

O—P, and A Constant Reader, are under consideration.



A DOUBLE FOUNTAIN LAMP.

A DOUBLE FOUNTAIN LAMP.

The annexed description of a novel and curious lamp, we received from the inventor (J. M.) together with some other papers of great interest and originality, nearly three months ago; but various circumstances have hitherto prevented our giving them insertion. This delay, it is proper we should notice, as we have been recently informed that a patent has been taken out since the above mentioned period, for a fountain lamp, on a similar principle; with the details of which we are at present, however, entirely unacquainted.

The invention before us, (as represented on the other side,) is a lamp constructed on the principle of the Chemnitz fountain, but so modified as to maintain the two columns of the fluids always at the same height, and thus to furnish an equable supply of oil, as long as the lamp continues to burn. The form of the lamp is arbitrary; and may be modified and ornamented in various ways, so that it shall accord with the necessary hydrostatic and pneumatic pressures. The engraved figure represents a vertical section of the lamp.

a is a vessel containing water; *b* an oil vessel; *c c* a column and pedestal to support the lamp, closed at the top and bottom, and forming the air vessel; *d* an air tube in *a*, open at top and bottom; *e* a tube soldered into the top of the column *c*, and proceeding from the bottom of *a* to the bottom of a cup *f*; *g* a similar tube soldered to *c*, and proceeding from *b*, the lower end descends a little way into the cup *h*; *i* is a glass tube ascending from the bottom of the cup *h*, through a tight joint, and branching at top into three capillary jets, forming the burner, and the tube *l* which surrounds it, serves to receive any oil that may flow over: *m* and *n* are two plugs in the bottom of *e* and *g*.

To use the lamp, proceed as follows; invert the lamp, withdraw the plugs *m* and *n*; fill *a* with water, and *b* with oil; then replace the plugs in the position shewn in the drawing, and place the lamp on its base. The oil will now flow from *b* into *h*, until the mouth of the tube *g* is covered; at the same time the water flowing from *a* into *f*, will compress the air in *c*, which acting on the surface of the oil in *h*, will force it up the tube *i* to the burners; by this the oil in *h* will fall below the mouth of *g*, when a portion of the compressed air passes into *b*, displacing an equal bulk of oil; by these means the oil in *h* is always maintained at the same level as the mouth of *g*, the capacity of *a* is not equal to that of the base, up to the level of the brim of the cup *f*, but it is clear that by means of the air-tube *d* the height of the column of water will always be equal to the height of the lower opening of *d*, above the brim of *f*.

To extinguish the lamp, push the plugs *m* and *n*, into the necks of *e* and *g*, which stops the supply of oil.

The cup *f* is screwed into the bottom of *c*, and must be unscrewed to discharge the water in *c*, when the vessel becomes empty.

In varying the form of the lamp, it must be borne in mind, that the pressure of the column of water be somewhat greater than that of the column of oil which supplies the burner, and that the capacity of the base does exceed that of the vessel *a*.

IMPROVED CAP FOR A MALT KILN,

By Mr. James Perkins, of Stanstead, Herts.

The vapour that arises from malt when drying in the kiln, is discharged into the air, through a hood or cowl, which turns round by means of a vane, so that the opening shall always be in the opposite direction to that from which the wind blows. But the aperture of the common cowl, always remains of the same magnitude, and therefore the draft through the fire admits of no accurate regulation. Mr. Perkins's cap possesses all the advantages of the cowl, with the additional one of regulating the opening, and consequently the draft. Malt-houses are frequently set on fire in making high-dried malt, because the fire is not perfectly manageable. The cap invented by Mr. Perkins obviates this very serious inconvenience, besides that of entirely excluding wet when the wind is still, and the rain falls perpendicularly in showers, which is not effectually done with the common cowl, to the great injury of the malt lying on the floor, and the rusting of the wire-work that composes the floor.

Mr. Perkins's invention has been tried by Mr. Felix Booth, of Brentford, for several months, with complete success, who reports that he has found a saving in fuel to result from its use, and that the malt has been benefited by the facility which the invention affords of regulating and varying the heat, according to circumstances.

Fig. 2. Fig. 1.

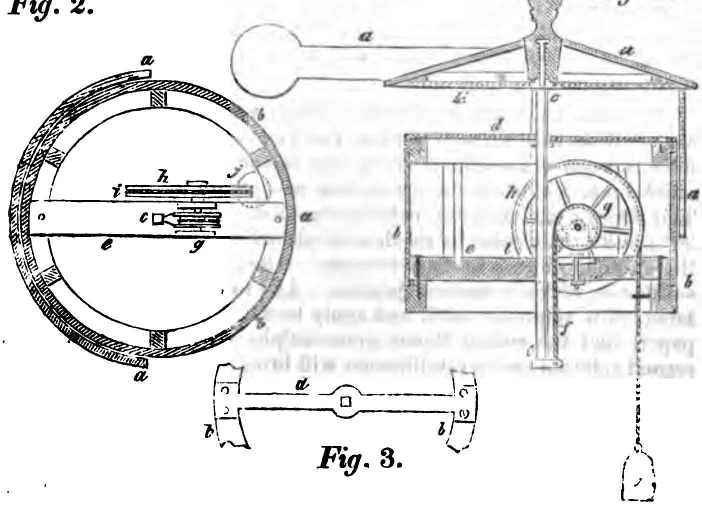


Fig. 3.

Reference to Figures. Fig. 1 represents the turn-cap *a a a*, and the neck *b b* in section; *c c* a square iron bar, or spindle sliding through a square hole in the middle of the iron plate or bar in *d*, and through another in the middle of the beam *e*; the cap *a a* turns upon

the upper cylindrical portion of this bar, and the bar itself is supported, and hangs entirely on the chain *f*, attached to the pulley *g*, which is mounted in a carriage on the beam *e*; on the same axis is a larger pulley *h*, with a chain attached to it at *i*, and from which a weight *j* hangs, sufficient to balance the weight of the sliding bar *c*, and turn-cap *a a*. By raising the weight *j* the cap is lowered, and finally shut, and on lowering the weight the cap is raised quite up, or held at any intermediate height.

Fig. 2 is a section of the neck between the bars *d* and *e*. Fig. 3 a top view of the bar *d*, shewing the hole through which the spindle passes; *k*, fig. 8, is a similar iron bar across the cap *a a*. The chain *f* should be attached quite close to the bar *c c*, to lessen its tendency to lean on one side.

The large silver medal of the Society of Arts was presented to Mr. Perkins for this invention, a model of which is placed in its Repository. *Trans. Soc. Arts*, Vol. xlv.

SULPHATE OF QUININE.

We have received the annexed formula for the preparation of this valuable medicine, from a chemical gentleman lately from France, and we make no doubt that it is the genuine process adopted in that country. Such is the repute of this medicine on the Continent, that in the year 1826, upwards of 90,000 ounces were manufactured in France, and during the last year a considerably greater quantity. We understand that the Sulphate of Quinine is imported from France into this country; our own chemists may now, however, manufacture it for themselves.

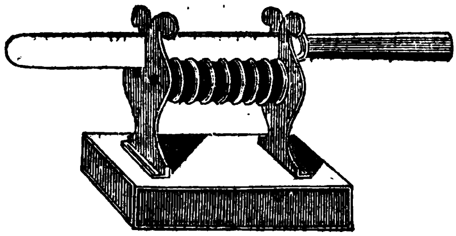
"To a killo-gramme* of water, add 6 or 8 grammes† of sulphuric acid. With this dilute acid treat the bark several times with heat, filter through close linen. Free the liquor from colour by adding quick lime, and wash the precipitate to separate the excess of lime. This deposit well drained, is to be digested repeatedly in alcohol at 36°; unite the alcohol in an alembic placed in a water bath, distil off the alcohol, which will do over again. The residue is a brown bitter substance, which is impure Quinine. Add to this mass, water acidulated with sulphuric acid, and apply heat. Filter through filtering paper, and the cooled liquor gives sulphate of Quinine, which a second solution and crystallization will bring quite pure."

PATENT KNIFE SHARPENER,

By William Parkin, of No. 50, Strand.

The annexed cut serves to explain the construction without the ornament of an elegant article now introduced as an appendage to the table, for the purpose of sharpening knives; it consists of two hori-

* A killo-gramme is about 2lbs. 3¼oz. avoirdupois.
† A gramme ....15½ grains.



zontal rollers placed parallel to each other, one only of which is brought into view in the figure, although the axis of the second will be observed, as (owing to the perspective) under the edge of the knife, which is however placed *between the two rollers*, and being drawn two or three times betwixt them from heel to point, the knife is sharpened, as if rubbed against what is termed a steel. The rollers revolve freely upon their axes; and at uniform distances there are fixed narrow cylinders, or rings of steel, the edges of which are finely cut with file teeth, forming thereby circular files; the edges of these files overlap, or intersect, each other a little, so that when a knife is drawn between them it operates on both sides of the edge at once; and as the rollers turn round at the slightest impulse, the peripheries of the circular files get uniformly worn, and consequently will last a long time. In sharpening a knife well with a steel some expertness is requisite, but in this little apparatus none whatever is necessary; its utility is therefore unquestionable.

Chemistry.

New Substance that inflames on Water.—At Doulens, near Amiens, is a large cotton factory, belonging to M. Morgues, which is lighted by oil gas. This gas, after issuing from the cylinder in which it is formed, passes through a vessel of oil, in which it deposits a white liquid substance, by means of a cock in the lower part of the vessel. A workman passing spilled some of this upon wet ground, it took fire spontaneously, and having flowed into a neighbouring brook it spread over the surface which appeared to be on fire.—*Bull. Univ.*

Indelible Writing Ink.—Let a saturated solution of indigo and madder in boiling water be made in such proportion as to give a purple tint; add to it from one-sixth to one-eighth of its weight of sulphuric acid, according to the thickness and strength of the paper to be used. This makes an ink which flows pretty freely from the pen; and when writing, which has been executed with it, is exposed to a considerable but gradual heat from the fire, it becomes completely black, the letters being burnt in, and charred by the action of the sulphuric acid. If the acid has not been used in sufficient quantity to destroy the texture of the paper, and reduce it to the state of tinder, the colour may be discharged by the oxymuriatic,

and oxalic acids, and their compounds, though not without great difficulty. When the full proportion of acid has been employed, a little crumpling and rubbing of the paper reduces the carbonaceous matter to powder; but by putting a black ground behind them, they may be preserved: and thus a species of indelible writing-ink is procured, (for the letters are in a manner stamped out of the paper), which might be useful for some purposes, perhaps for the signature of bank notes.—*Journal Royal Inst.*

Iodine.—From some recent experiments of Mr. Balard, of the French Academy, it appears that iodine, which is found in most marine productions, and in sea water generally, does not exist in the water of the Dead Sea, nor in that of Trieste, although abundant in the Mediterranean generally.

Anatomy & Medicine.

Distribution of Nerves in Muscular Fibres.—In a memoir on muscular action, M. M. Dumas and Prevost have communicated some very interesting microscopical observations on the distribution of the nerves in the muscular fibres, and on the forms which these latter assume during their contractions. They placed a thin piece of muscle retaining its nerves under the microscopes, and made it contract by means of galvanism. The fibres contracted by bending in a zigzag manner, and the last nervous filaments were seen to proceed parallel to each other from the branch giving origin to them, to be inserted precisely at the points where the fibres form their angles.

Use of Chlorine in Phthysis.—The French Physicians are experimentalizing on the effects of chlorine in pulmonary consumption. M. Garnel remarked, that among the workmen who were employed at a manufactory for bleaching linen, those who had joined the business while labouring under any affection of the breast, found themselves sensibly better in a short time, and hence he was led to suspect, that the emanations from chlorine, to which they were exposed, might be the cause. The results of his own experiments, however, have not as yet been very satisfactory.

END OF VOL. I.

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